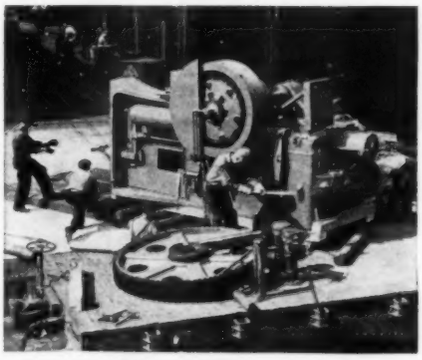
American Machinist

A McGRAW-HILL PUBLICATION

January 26, 1938



New Equipment—Modern machinery continues to move into progressive plants despite the vagaries of the business barometer

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Volume 82 — Number 2

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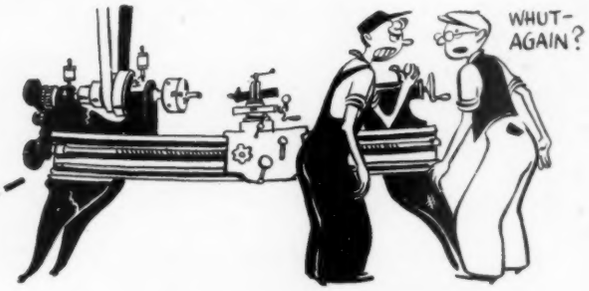
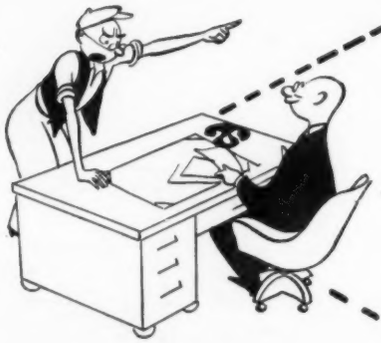
BRIGHTON, BOSTON, MASS.

workmanship and expedites production throughout the shop.

The Lay of the Ancient Lathe...



"This lathe has just stopped perkin',
A thousandth grows to ten —
It's time we had a new one!"
Says Jack to Foreman Ben.



Says Foreman Ben to Super Lee:
"What Jack, here, says is right!
There's no use fixing *that* lathe,
We just can't keep it tight!"

Says Super Lee, "A new one
Will solve our urgent need.
A. M. will give the answer.
Before we talk, we'll read!"

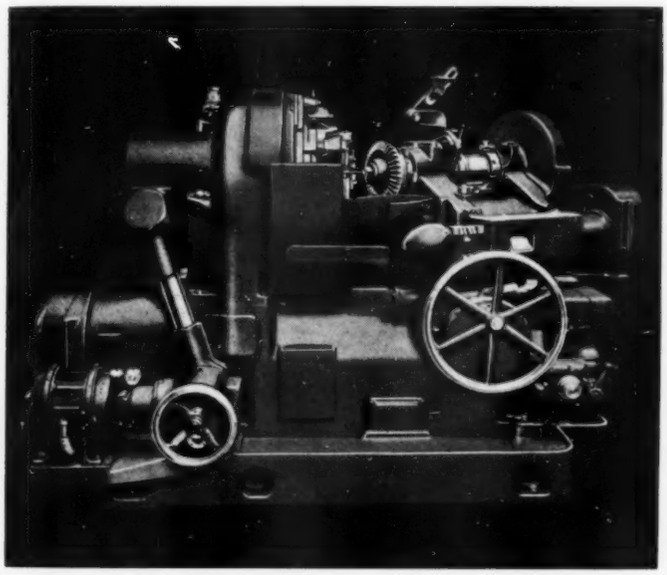
They first check new equipment
Then look up "Where to Buy",
Next "Advertisers' Index",
And ads, where makers vie.

'Twixt catalog description
And advertising page,
They find what they are seeking;
Then make decisions sage.

The salesman need not seek them
They send for him in haste —
The Ref'rence Number helps them
To cure production waste.

. . . how this new Reference Number points the way to . . replacement

Improve Quality with New GLEASON BEVEL GEAR MACHINERY



12" STRAIGHT BEVEL GEAR GENERATOR

Being fully universal this machine is recommended for both large and small quantity production. Gears produced are correctly generated and of the highest quality.

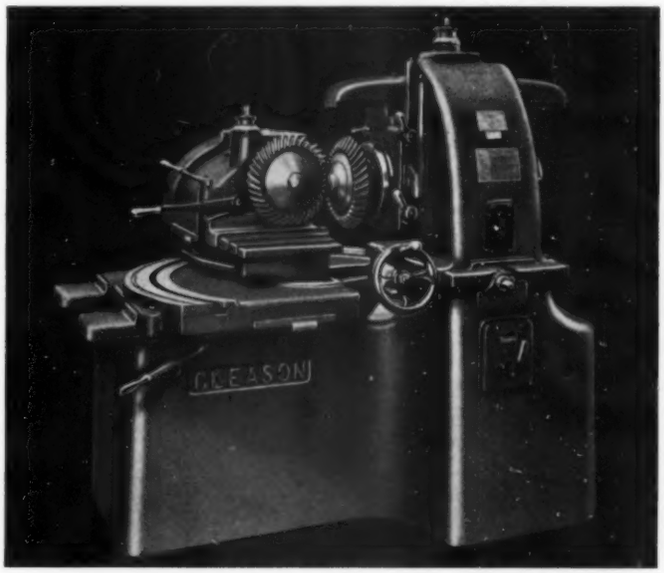
High tool speeds and feeds make the machine ideal for production work. The ease and speed with which the machine is set up or changed from rough to finish cutting make it profitable when work is done in small quantities. Capacity —24" pitch dia. 10 to 1 ratio—3 diametral pitch—3½" face.

The Gleason Works also offers Bevel Gear Machinery for cutting straight bevel gears from ¼" to 192" diameters

The No. 13 Universal Gear Testing Machine was designed to test the running qualities of all kinds of gears up to approximately 13" outside diameter. A manually operated brake is provided to test gears under load if desired.

The drive spindle has two adjustments, one vertically and one horizontally. The driven spindle has an angular adjustment from 0° to 180° and adjustments in the horizontal plane.

The Gleason Works also manufactures a complete line of machinery for curved tooth Spiral Bevel and Hypoid Gears of suitable capacity for gears from ¼" to 120" diameter.

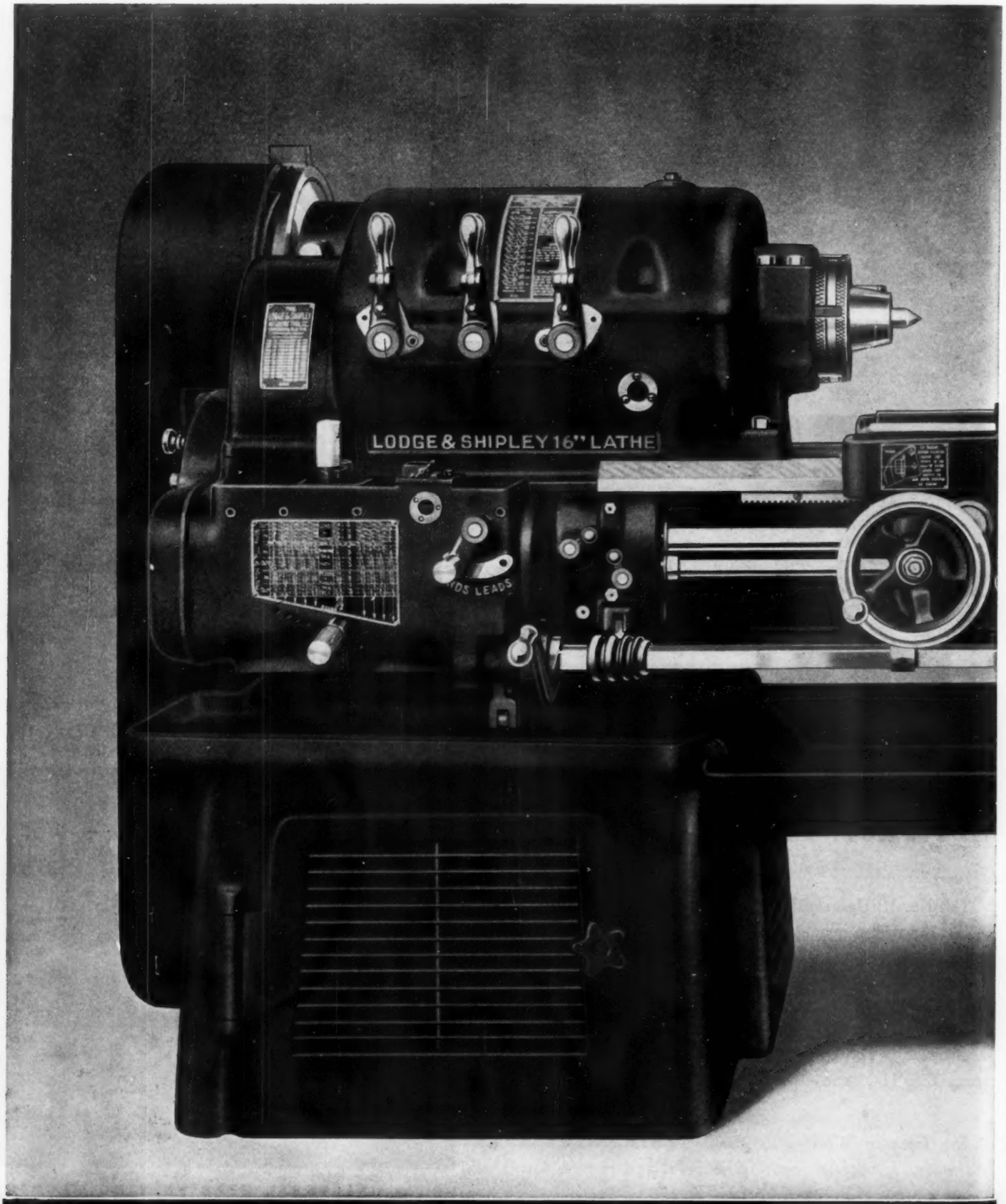


NO. 13 UNIVERSAL GEAR TESTING MACHINE

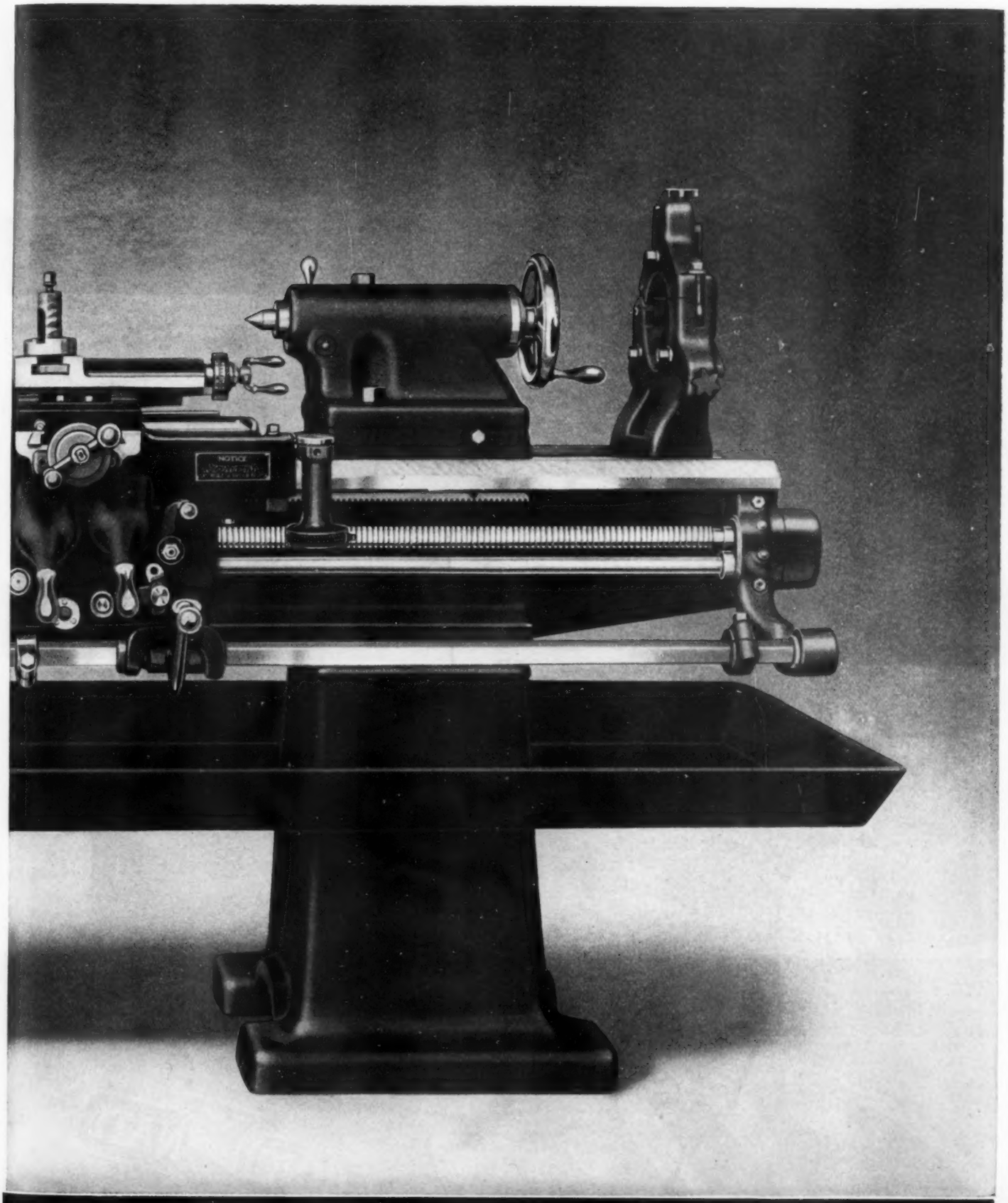
GLEASON WORKS

Builders of Bevel Gear Machinery for Over Seventy Years

1000 UNIVERSITY AVENUE, ROCHESTER, N. Y., U. S. A.

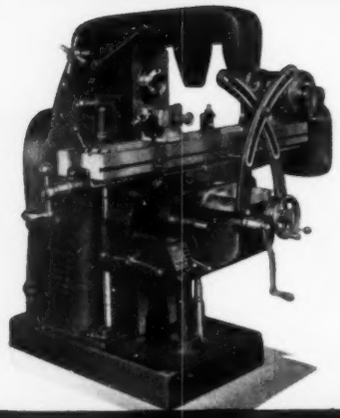


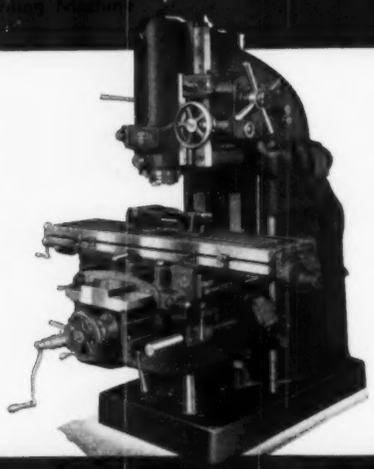
FOR
LATHES *Good* LATHES ONLY
. . . . . SINCE 1892

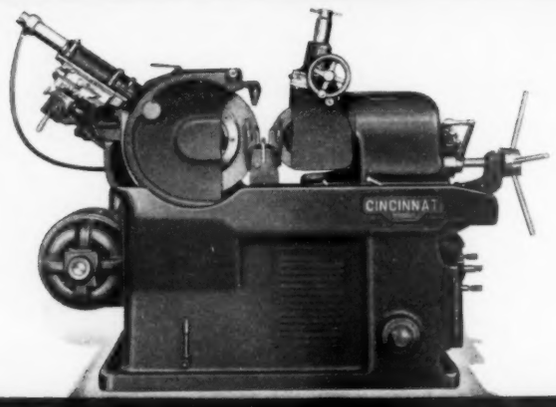


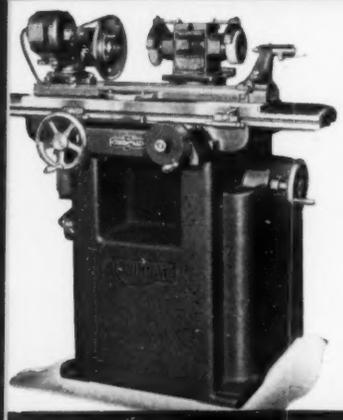
THE LODGE & SHIPLEY MACHINE TOOL COMPANY

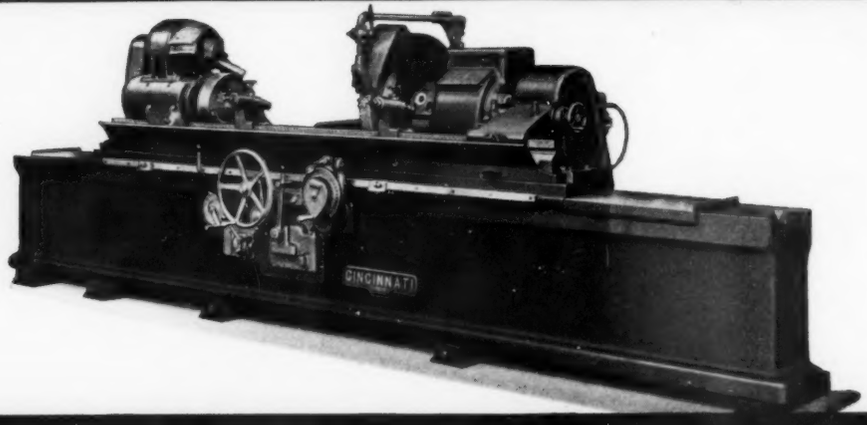
CINCINNATI, OHIO, U. S. A.







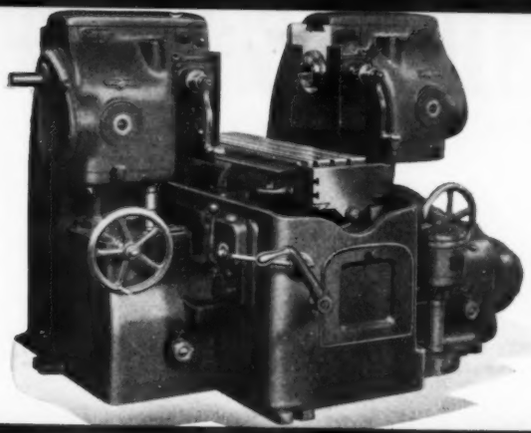


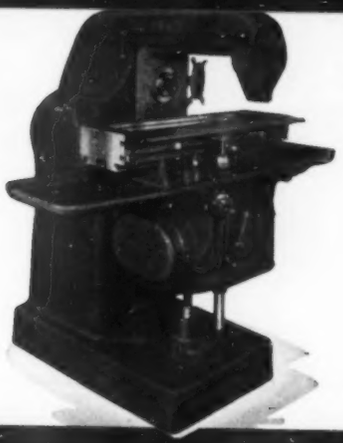


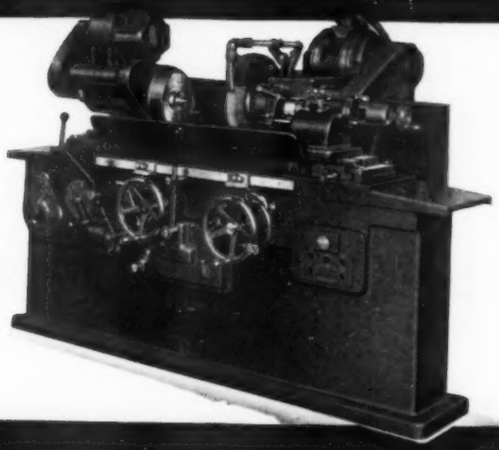
Efficiency

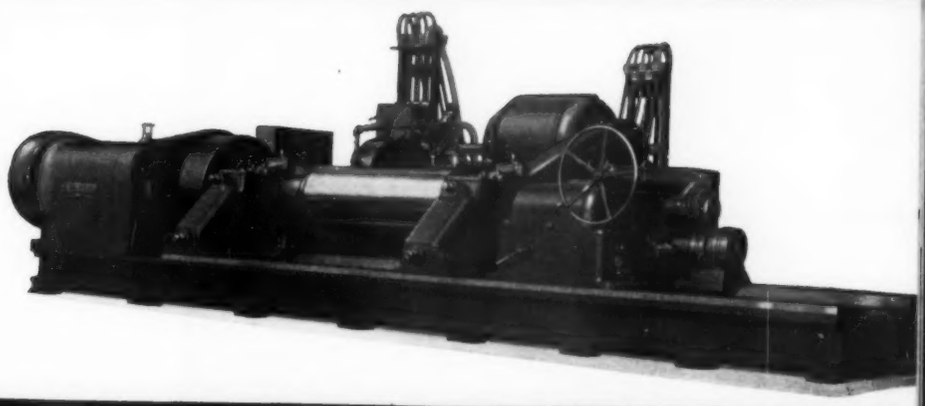
CINCINNATI

A SYMBOL OF [illegible] OF WORTH







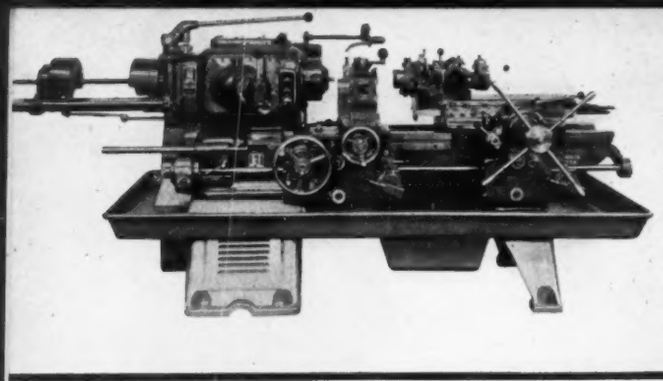


THE common factor in the extensive lines of CINCINNATI Machines ... efficiency ... is made possible by more powerful drives and faster speeds ... greater operating conveniences ... improved safety features and refinements in accuracy reflected in your products. These are the characteristics of the CINCINNATI Machines which will help you meet your 1935 manufacturing cost-reducing requirements.

Complete information on CINCINNATI Milling, Broaching, Grinding, Lapping and Die Sinking Machines is yours for the asking.

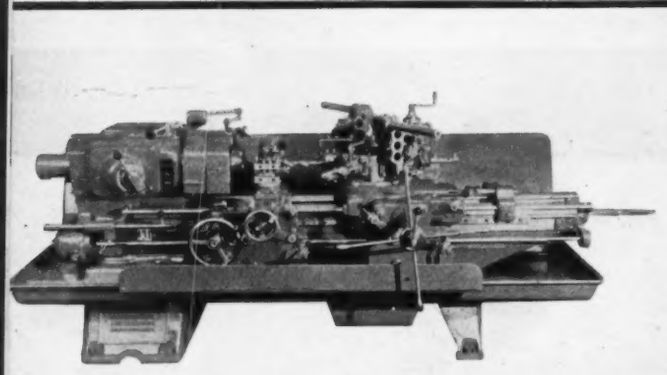
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI GRINDERS INCORPORATED
CINCINNATI, OHIO, U. S. A.

MACHINE TOOLS

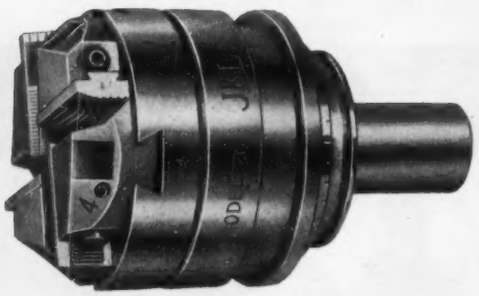


THE J & L LINE OF

RAM TYPE UNIVERSAL TURRET LATHES

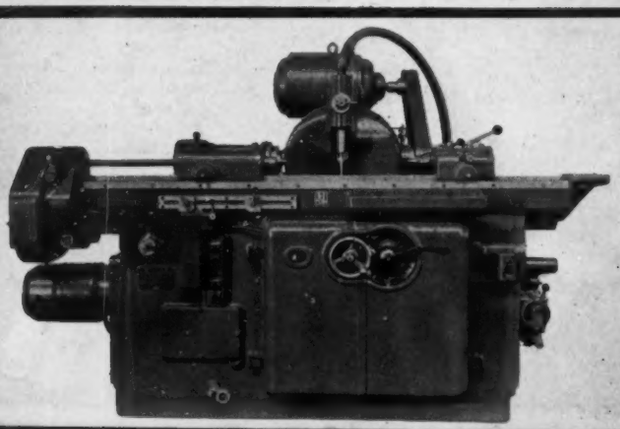


SADDLE TYPE UNIVERSAL TURRET LATHES



AUTOMATIC DIE HEADS

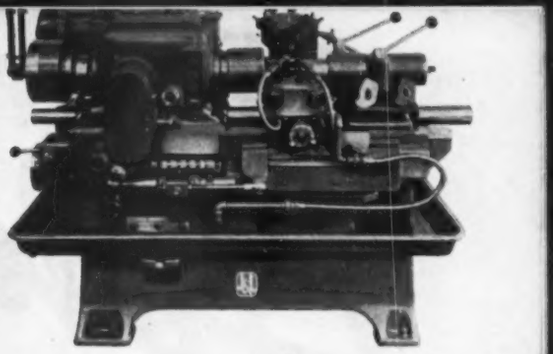
COMPARATORS



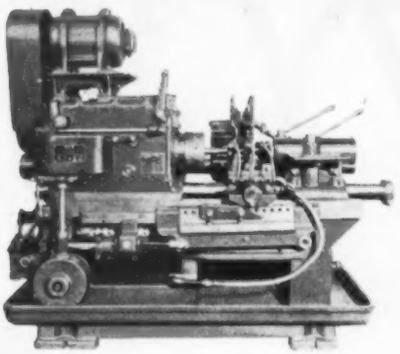
THREAD GRINDERS

JONES & LAMSON
SPRINGFIELD · VERM

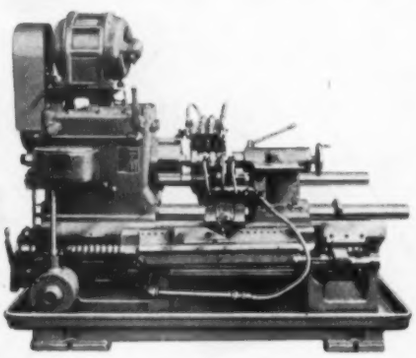
MACHINE TOOLS



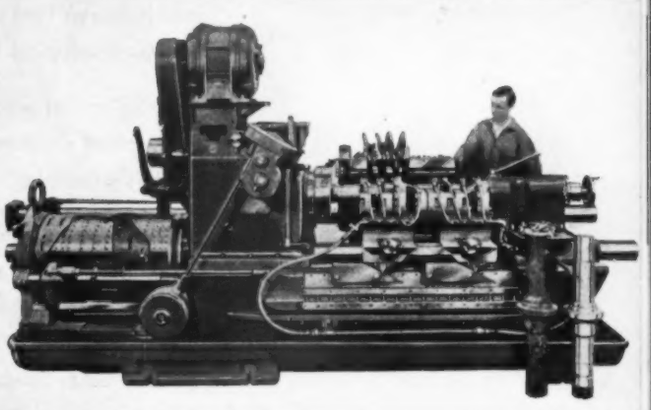
8 INCH FAY AUTOMATIC LATHES



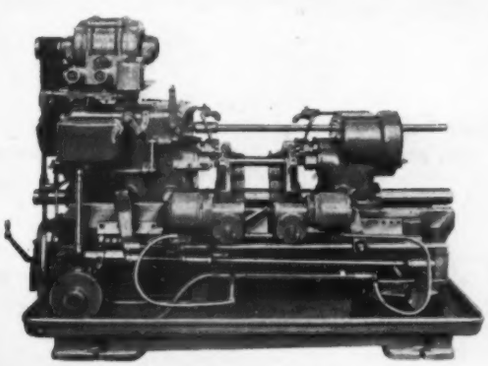
12 INCH FAY AUTOMATIC LATHES



20 INCH FAY AUTOMATIC LATHES



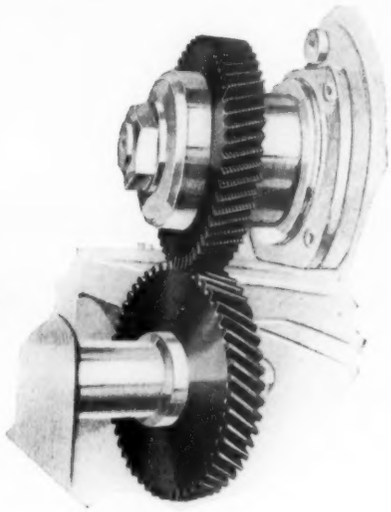
24 INCH FAY AUTOMATIC LATHES

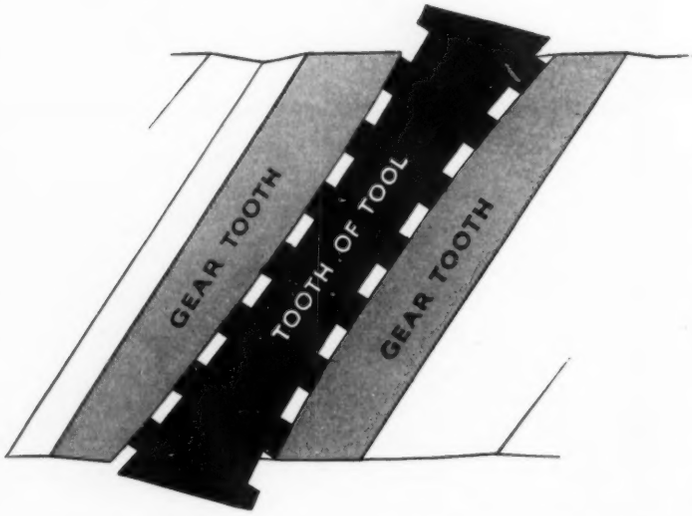


DOUBLE END MILLING & CENTERING

SCN MACHINE CO.
VERMONT · U · S · A ·

How THE ENVELOPING





The "bowed" shape of the teeth on the enveloping tool assures positive control over accuracy and finish.

The explanation is here presented diagrammatically. The sides of the teeth on the enveloping tool are ground to conform to the bowed shape of the teeth on the work, and thus provide positive control between tool and work. The resultant advantages are *exclusive* with the Enveloping Gear Generating Process.

The relative angular setting of tool and work axes has a direct bearing on the cutting action of the tool and the finish obtained. The greater the relative angle, the better the cutting action and the higher the rate of production. With a high angular setting, however, there is danger of loss of control between tool and work, and with it loss of accuracy and finish, *unless* the tool is of the enveloping type. The Enveloping Gear Generator *only* uses such a tool.

Averaging of errors is accomplished by providing the tool with a hunting tooth, by high speed rotation and slow traverse. *Only* the Enveloping Gear Generator operates on this principle.

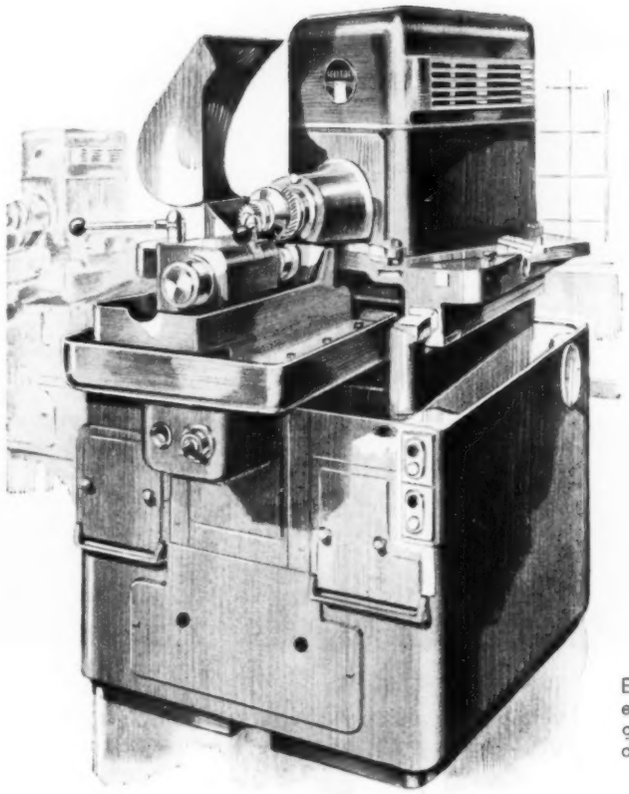
The third important feature is an automatic cam feed for depth, which also holds the work and tool at a fixed center distance when tool is traversed. This assures duplication of size. Other important advantages of the Enveloping Generating Process are fully explained in a new circular which will be mailed upon request. Write: The Fellows Gear Shaper Company, Springfield, Vermont—or 616 Fisher Building, Detroit, Michigan.

The Fellows Line of Products includes:

GEAR SHAPERS • HOURGLASS GEAR SHAPERS • COMPLETE LINE OF CUTTERS • THREAD GENERATORS • MASTER GEARS • LAPS AND LAPPING MACHINES

GEAR GENERATOR

holds ACCURACY under More Positive Control



Enveloping Gear Generator for finishing gears on a high production, low cost basis.

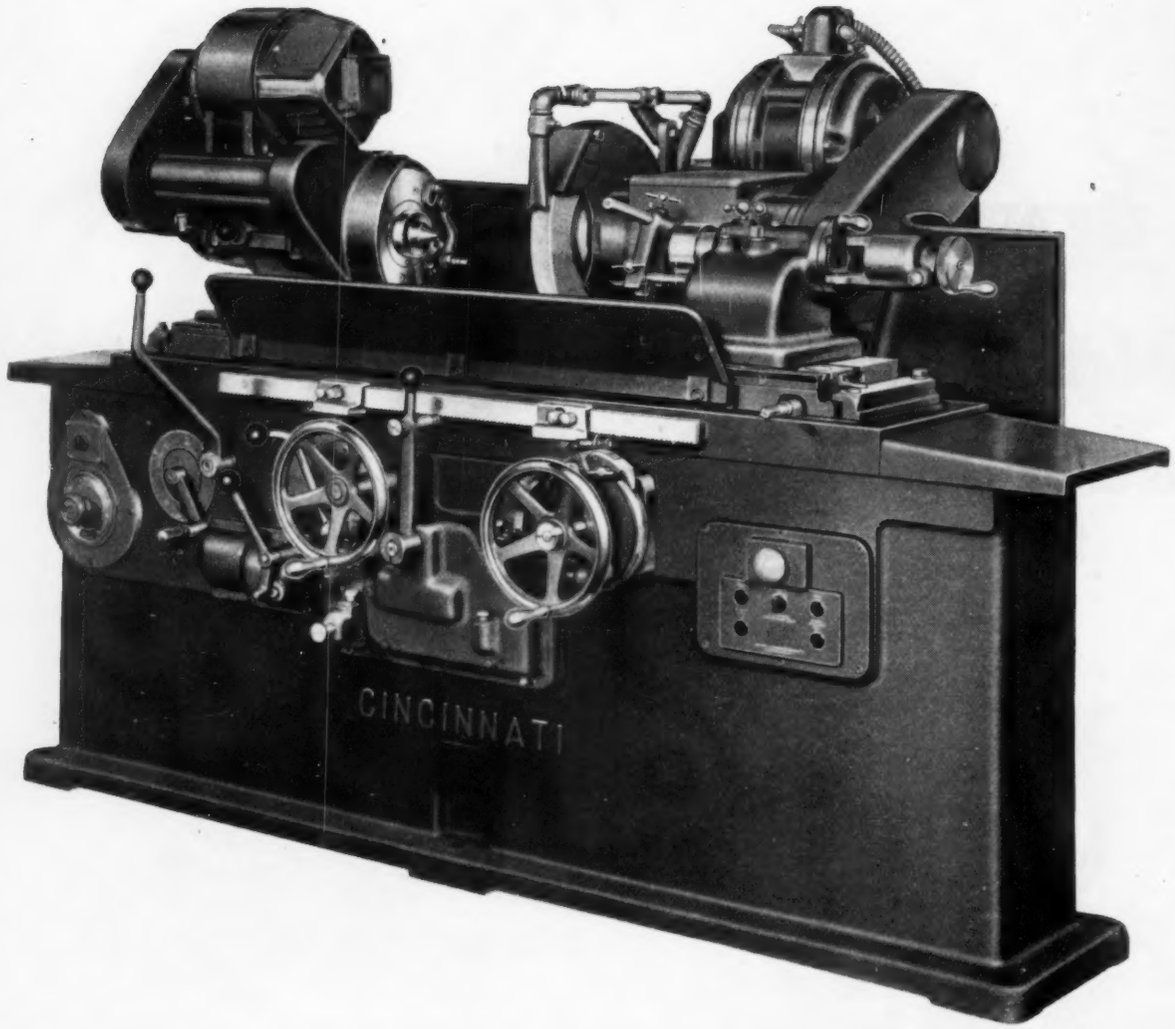
A NEW GEAR FINISHING PROCESS FOR *Volume Production* REQUIREMENTS

BURNISHING GEARS

FELLOWS

GEAR FINISHING METHODS

TESTING EQUIPMENT • HELICAL CUTTER SHARPENER



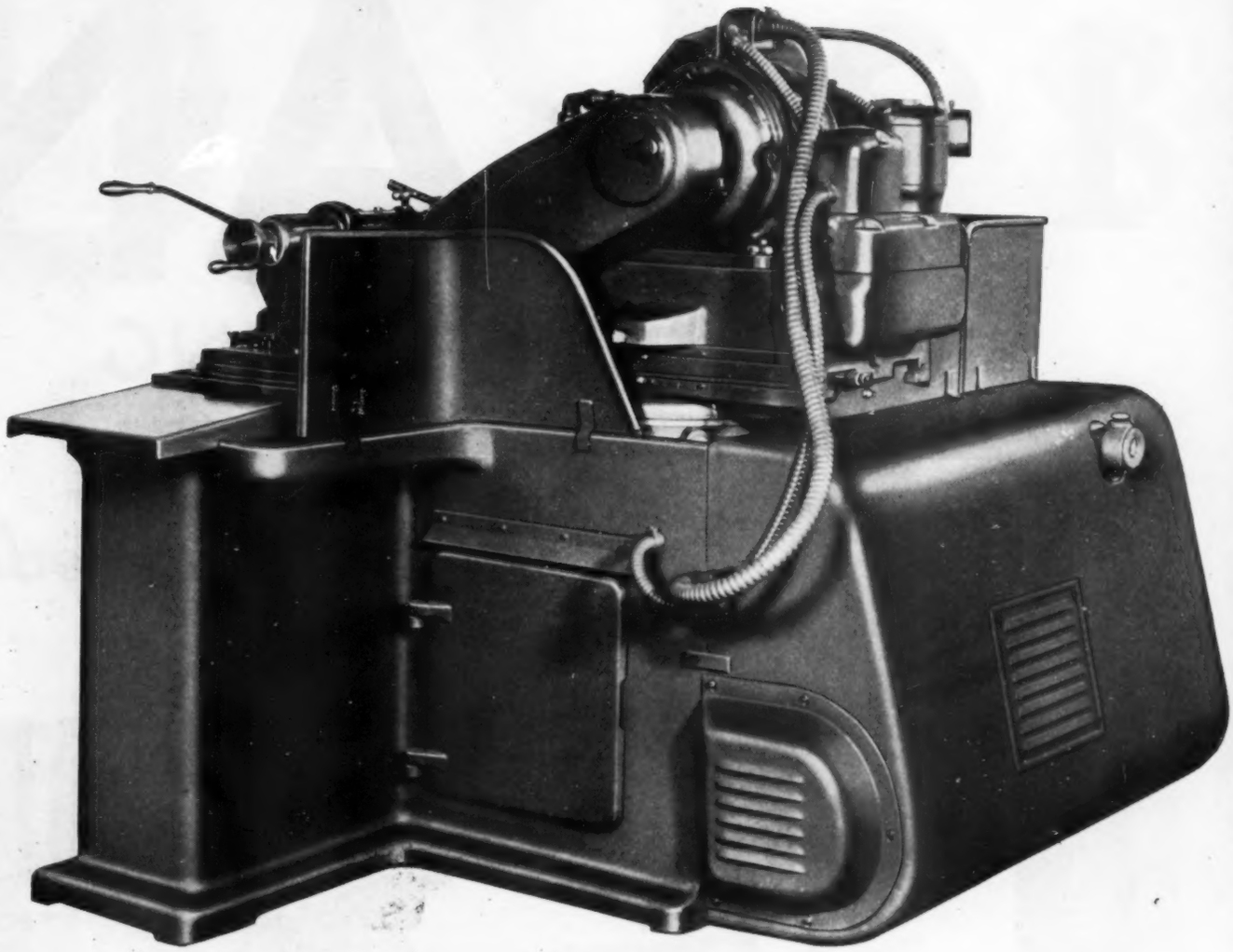
NEW FROM WHEEL HEAD TO FLOOR . . .

THE New CINCINNATI 12″ and 16″ Universal Grinding Machine. New from wheel head to floor! Husky, but a fully universal grinding machine for your toolroom or job shop. A combination of the profitable features of both plain and universal machines.

You get improved productivity . . . rapid metal removal . . . fine finishes . . . close tolerances . . . negligible maintenance costs comparable to plain machines . . . and the versatility of universals so necessary for the profitable grinding of your work.

All these are now possible with this new machine having . . . new type of spindle bearing, self-compensating for changes in depth of grind from heavy roughing to fine finishing . . . spindle bearings automatically lubricated before wheel rotates, filtered oil under pressure . . . square gibbed slide and narrow guides, protected from dirt, for wheel head cross adjustment . . . built-in electrical

CINCINNATI



HUSKY BUT FULLY UNIVERSAL . . .

controls and starting equipment . . . master stop button for stopping complete machine . . . live or dead spindle headstock without gears or worm drives . . . heavy one-piece bed, providing unusually long support for table . . . fixed or swinging type internal attachment (latter extra cost) . . . and many other standard features.

See these and many other profitable features illustrated in new booklet G 414. Write for your copy.

Both Centerless and Center Type Grinders

CINCINNATI

A SYMBOL OF A DEFINITE STANDARD OF WORTH

GRINDERS INCORPORATED

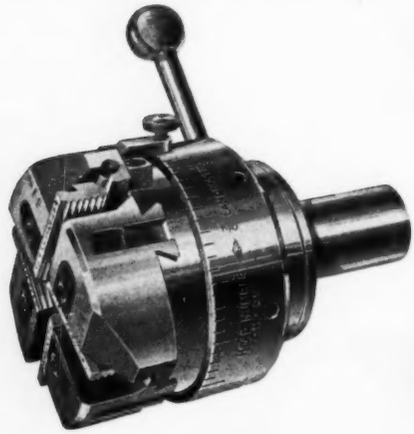
CINCINNATI, OHIO, U. S. A.

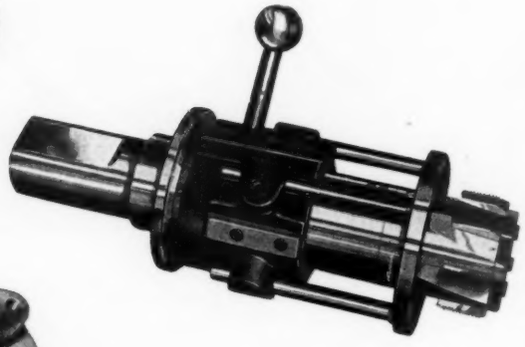
19 LAN

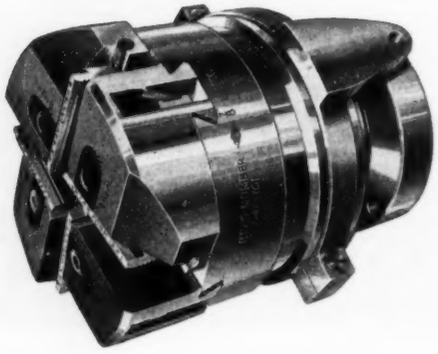
THREAD CUTTING

LANDIS DIE HEADS

"More so today







COLLAPSIBLE TAPS

The LANDIS *Line*

STANDARD THREADING MACHINES
LANDMACO THREADING MACHINES
BOLT FACTORY THREADERS
AUTOMATIC FORMING AND THREADING MACHINES
PIPE THREADING AND CUTTING MACHINES
PIPE AND NIPPLE THREADING MACHINES
ROLLER PIPE CUTTERS
CHASER GRINDERS
ROTARY BOLT THREADING DIE HEADS
STATIONARY PIPE DIE HEADS
LANDMATIC HEADS FOR TURRET LATHES
LANDEX HEADS FOR AUTOMATIC SCREW MACHINES
LANCO HEADS FOR HAND-OPERATED THREADING MACHINES
LANDIS COLLAPSIBLE AND ADJUSTABLE TAPS

LANDIS MACHINE

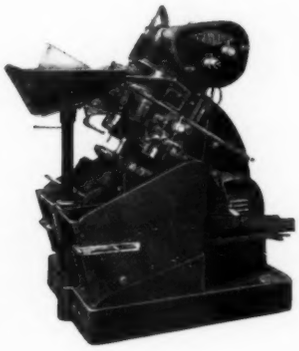
DIS 38

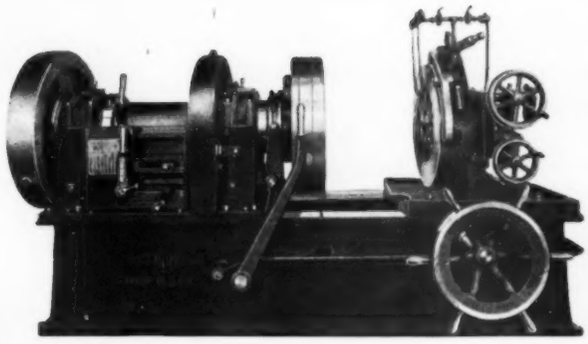
EQUIPMENT

than ever before"

BOLT THREADING MACHINES

PIPE THREADING MACHINES





• Progress demands more production, greater accuracy, and increased economy. Your problem may be any one of these three or it may be all of them.

• Regardless of your requirements, remember this, LANDIS Threading Die Heads and Threading Machines are more essential today than ever before, because they will more efficiently meet these demands for progress through 1938.

COMPANY **WAYNESBORO—PA.**

American

LATHES
RADIALS
SHAPERS

Cost Cutters for 1938

Practically all of the most common metal working operations come within the scope of "AMERICAN" TOOLS and are definitely modernized by "American" Lathes, Radials and Shapers.

. . . production turning operations achieve tool room precision and approach single purpose performance on the machining of duplicate parts.

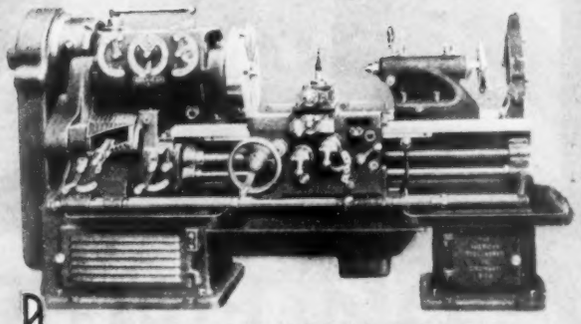
. . . with vastly speeded up drilling requiring less operating effort, "American" includes economical spot-facing, trepanning, reaming and boring on the same machine.

. . . metal removal by shapers has been stepped up 60% as compared with the capacity of ten year old machines.

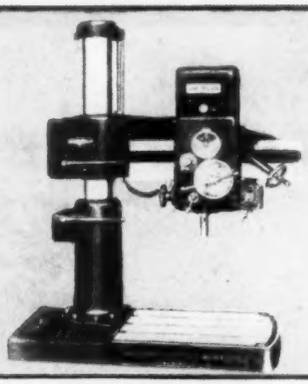
Production costs in 1938 can be cut. Modernization with "American" Tools points the way.

The AMERICAN TOOL WORKS CO.

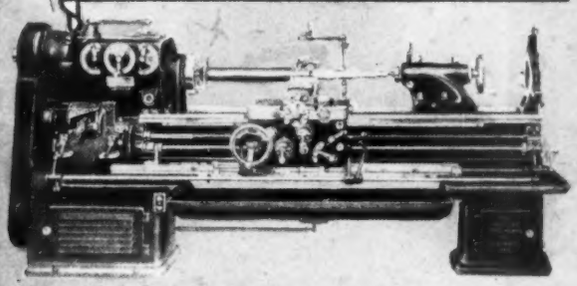
CINCINNATI, OHIO . . . U. S. A.



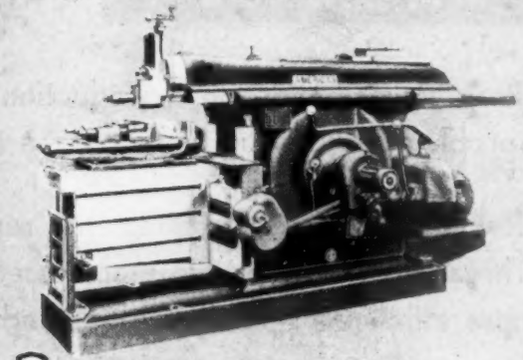
AMERICAN HIGH DUTY LATHES



AMERICAN HOLE WIZARD



AMERICAN MULTI-PRODUCTION LATHES



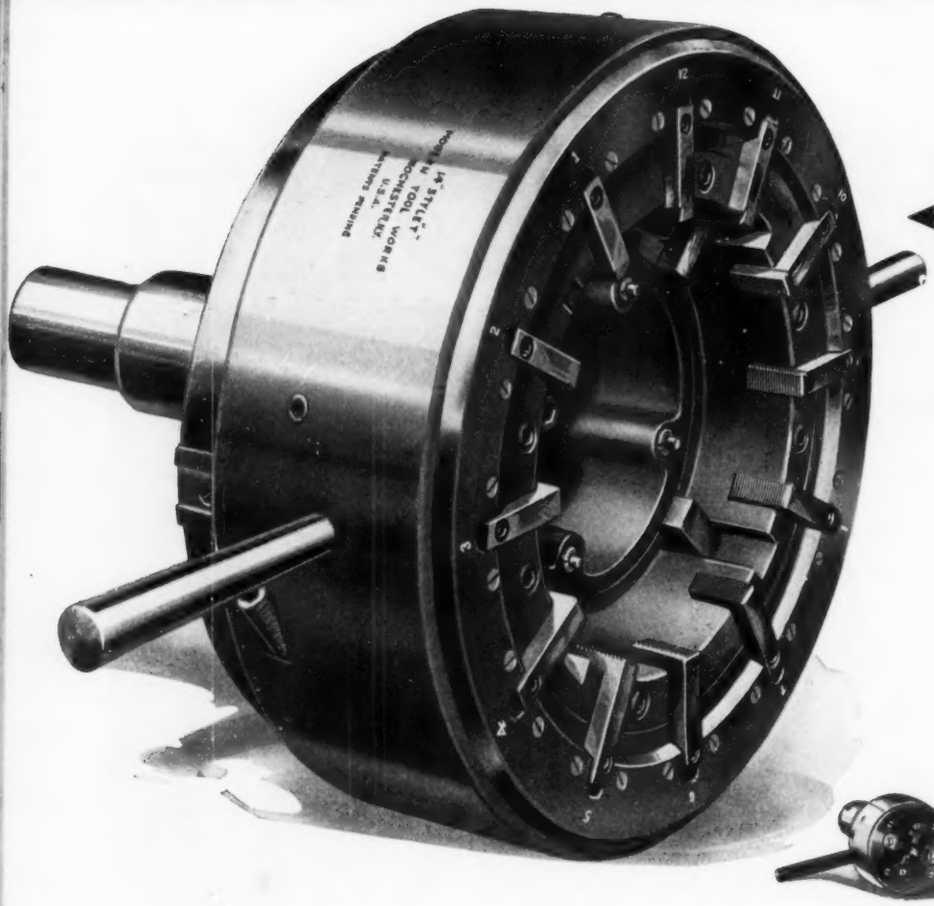
AMERICAN AUTO OILED SHAPERS

ARMSTRONG

TOOL HOLDERS
WRENCHES
"C" CLAMPS
Lathe DOGS
RATCHET DRILLS
SETTING UP TOOLS
Machine Shop Specialties
and ARMSTRONG BROS.
PIPE TOOLS

THRUOUT the metal trades tool buyers recognize "ARMSTRONG" and the Arm-and-Hammer as a sound guarantee of a quality tool . . . a guarantee of greater strength finer steels, improved designs, accurate machining, hardening and finishing . . . a guarantee of longer tool life and lower tool costs.
Write for Catalog B-35

ARMSTRONG BROS. TOOL CO. *"The Tool Holder People"* **CHICAGO, U.S.A.**



They're Both MODERN DIE HEADS

When the job is thread cutting, think of Modern. Whether the thread is ⅛" or 14" diameter—or more. Whether it is quantity work, or limited runs of various sizes you will find Modern Die Heads ideal for your use.

Accuracy, ruggedness, simplicity and dependability, make Modern Die Heads stand up on straight production work—and wide threading range and ease of chaser change make them readily adaptable for general purpose work.

A small investment in Modern Die Heads equips your shop for all your threading requirements for with only three Heads you can take care of threads from ⅛" to 2". The sure way to reduce costs on your thread cutting is through the use of Modern Die Heads, that give you accurate, speedy operation with adaptability and freedom from trouble.

Style T Stationary Self - Opening Die Heads available in six sizes in capacities up to 2".

Style B Stationary Self - Opening Die Heads available in ten sizes from 2½" to 7" capacities.

MODERN TOOL WORKS

DIVISION OF CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER **NEW YORK**

Crank Gear for Shaper 24" diam.
Coffee-Mill Burr—4"
Worm Box for Hydraulic Attachment, 15" max. dimension
High-Pressure Pump actuates hydraulic plungers on Shearing Machine. Max. Section 1½". Min. ¾".
for difficult CASTINGS
depend on
Valve Liner for Steam Engine 11½" O. D.
Blank Gear for Lens Grinder
METAL MEEHANITE

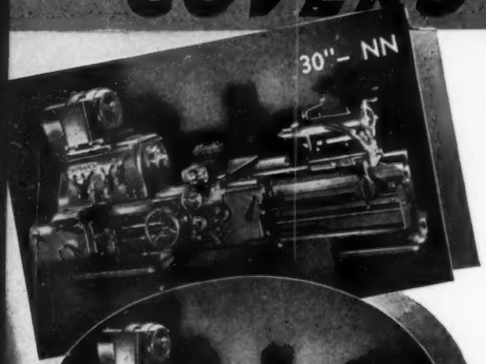
From the big gear for grinding the reflector of a 200-inch telescope, the largest in the world, to the intricate precision-made part of the most delicate small mechanism—many are the uses to which the highly adaptable casting metal, MEEHANITE, brings advantage. Extraordinary strength and toughness, close grain, great uniformity, resistance to wear and corrosion are among its merits—at relatively low cost. Ask for specification data.

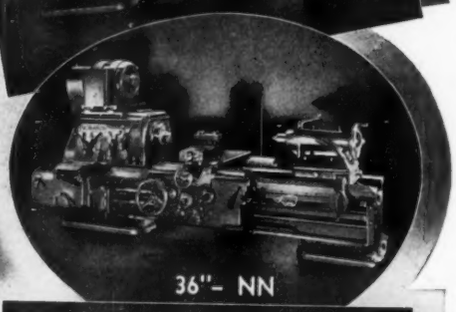
ON ANY EXACTING USE . . . . . CONSULT THESE LICENSED MANUFACTURERS

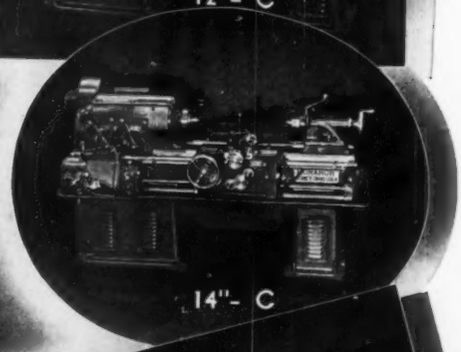
Heavy Gears...Fly Wheels...Hoppers ... Ore Buckets ... Camshafts ... Crankshafts ... Sprockets ... Metal Forming Dies ... Small Gears ... Precision Parts of engines, compressors, printing presses, calculating machines, etc., etc.

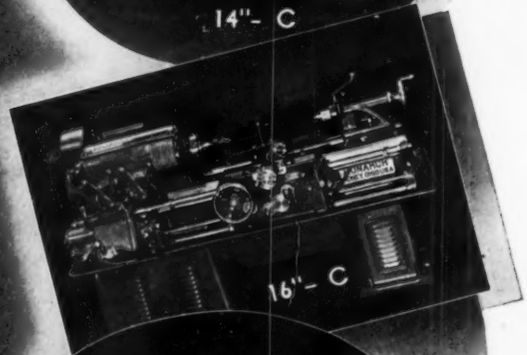
American Laundry Machinery Co.	Rochester, N. Y.
Atlas Foundry Co.	Detroit, Mich.
Banner Iron Works	St. Louis, Mo.
H. W. Butterworth & Sons Co.	Bethayres, Pa.
Cincinnati Grinders Incorporated	Cincinnati, Ohio
The Cincinnati Milling Machine Co.	Cincinnati, Ohio
Coop-er-Bessemer Corporation	Mt. Vernon, Ohio
Crawford & Doherty Foundry Co.	Portland, Oregon
M. H. Detrick Co.	Peoria, Ill., Newark, N. J.
Farrel Birmingham Co.	Ansonia, Conn.
Florence Pipe Foundry & Machine Co. (R. D. Wood Company, Philadelphia, Selling Agents)	
Fulton Foundry & Machine Co.	Cleveland, Ohio
General Foundry & Mfg. Company	Flint, Mich.
General Iron Works	Denver, Colo.
Greenlee Foundry Company	Chicago, Ill.
Hamilton Foundry & Machine Co.	Hamilton, Ohio
Kanawha Manufacturing Co.	Charleston, West Va.
Kinney Iron Works	Los Angeles, Calif.
Koehring Company	Milwaukee, Wis.
Rossdale Foundry & Machine Co.	Pittsburgh, Pa.
Ross-Meehan Foundries	Chattanooga, Tenn.
Vulcan Foundry Company	Oakland, Calif.
Warren Foundry & Pipe Corp.	Phillipsburg, N. J.
Washington Iron Works	Seattle, Washington

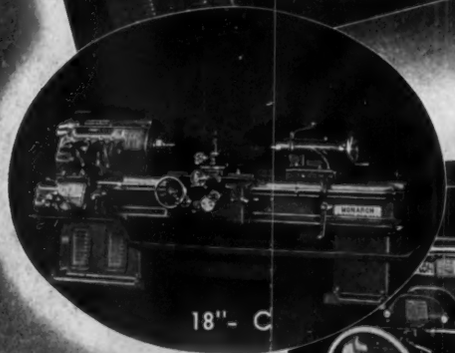
THE MONARCH LINE OF LATHES COVERS THE TURNING FIELD











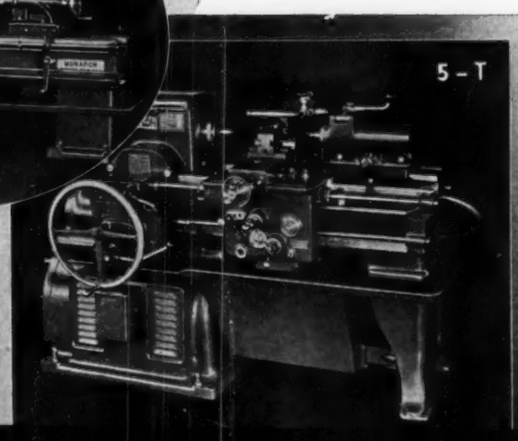
THERE is no such phrase as "can't be done" in the Monarch dictionary. Never was this fact more apparent than in the vast array of improvements already completed for 1937 and '38. Two 40-page catalogs packed with new features, greatly improved production and testing facilities, and full coverage of all lathe sizes from 12″ to 36″—these and many other new factors point more definitely than ever before to Monarch as the key to lathe modernization plans.

OUTSTANDING FEATURES LIKE THESE CHARACTERIZE ALL MONARCH LATHES . . . .

With each passing year, Monarch engineers have created many new features and advantages, most of them exclusive with Monarch. They speeded up operation, reduced costs, simplified jobs, and met the increasingly high standards, constantly being set by industry today.

1. All steel parts including headstock spindle, tailstock spindle, all shafts, gears, clutches, and operating parts in headstock, end gear train, quick-change gear box, and apron, including bed rack *are made of nickel alloy steel, electric furnace hardened.*
2. All headstock gears have tooth contours ground on P. & W. gear grinders, to a tolerance of .0002″.
3. Headstock provides sixteen quickly secured mechanical spindle speed changes covering a wide range.
4. All headstock gears are helical, quiet, smooth, and powerful, and never transmit gear tooth marks.
5. Anti-friction bearings used thruout Monarch lathes to reduce friction, and prolong accuracy.
6. The hardened cam-lock spindle nose, the quickest known means for the rigid and accurate mounting of chucks, plates, and fixtures.
7. Alloy steel hardened and graduated oversize tailstock spindle.
8. Automatic force feed lubrication to bed ways, carriage, apron, compound rest.
9. Large diameter direct reading compound rest and cross feed dials.
10. Four distinct sizes of precision tool room lathes distinctly different in design from the engine lathe, and combining "built-in-lead-screw reversing mechanism," together with many features making them outstanding for precision tool room work.
11. Special Alloy castings, many of which are made of Meehenaite, for all important units such as bed, carriage, compound rest, headstock, taper attachment, and many other parts.
12. All handles, hand wheels, and operating levers are chromium plated to prevent rusting or tarnishing.
13. Convenient leveling screws, in all legs, provide the best and most convenient means of preserving and maintaining accurate installation.

. . . .and many other outstanding designs, material and construction features that reflect Monarch lathe leadership.

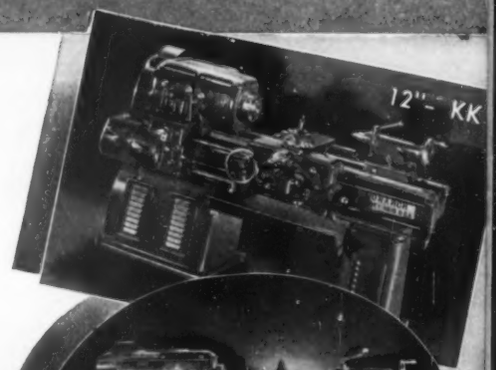


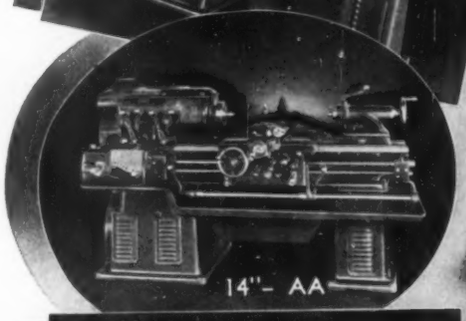
Modernize with Monarch!

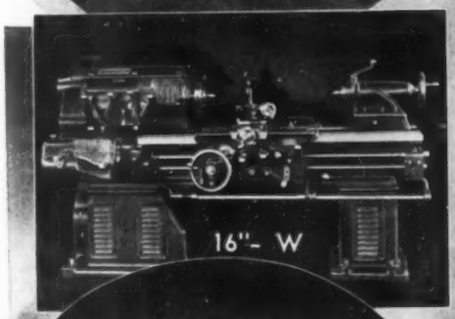
...and here are some of the Monarch Lathes accessories

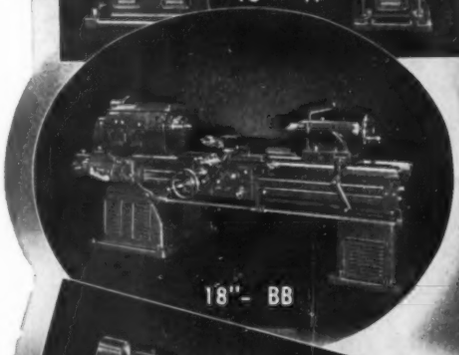
Production men and executives, concerned with lathe operation, have welcomed the presentation of each new Monarch accessory with enthusiasm, because experience has shown them that each of these new Monarch accessories has been specially designed to solve certain specific turning problems. Two-fisted production executives will recognize immediately the advantages made possible by the many new Monarch features, a few of which include:

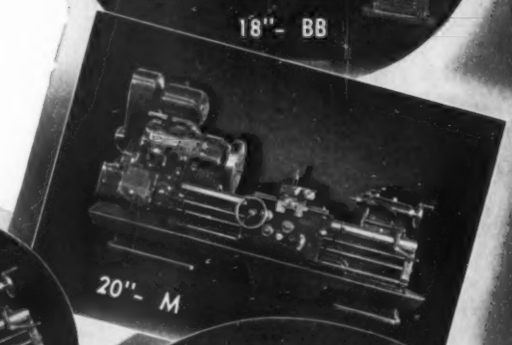
1. The anti-friction bearing taper attachment, which with the taper attachment variator provides maximum tapers to 90 degree included angle, and length turning taper capacity at one setting the maximum length the lathe accepts between centers. Also provides facilities for contour turning and boring from a master template.
2. Micro-gauging dials of great assistance to the operator in accurate and quick diameter setting of tools.
3. Built-in anti-friction bearing tailstock centers for modern high speed turning.
4. Large capacity oil and chip pan.
5. Power angular feed tool slide, single and double, for angular turning and facing.
6. All types of tool rests to increase production and reduce cost.
7. All types of work supporting rests including the anti-friction bearing types.
8. All types of single and multiple length and diameter feed stops.
9. Keller electric controls, on all sizes of lathes, for all types of irregular contour turning and boring.
10. Cam milling attachments on the Keller controlled lathes for milling irregular contour shapes.
11. The Centrode Devices for turning and boring shapes other than round.
12. Oval chucks for oval turning and boring.
13. All types of turrets for carriage and bed to broaden the scope of lathe work.
14. Relieving attachments as well as all accessories for precision tool room work.
15. The multi-speed drive for certain sizes of lathes. Any desired surface cutting speed, on all diameters, is automatically maintained.

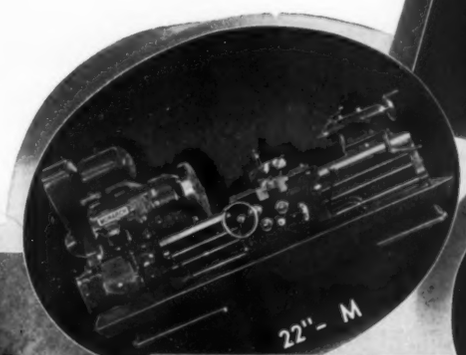


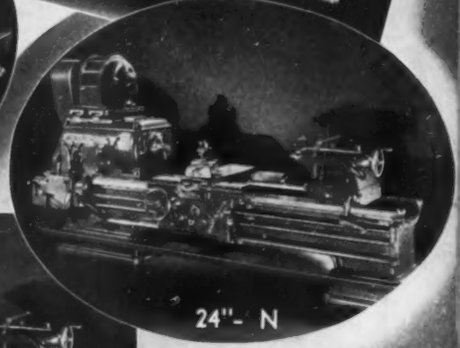


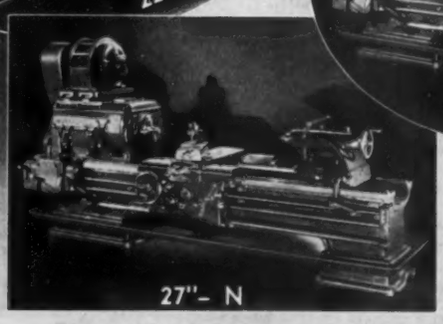


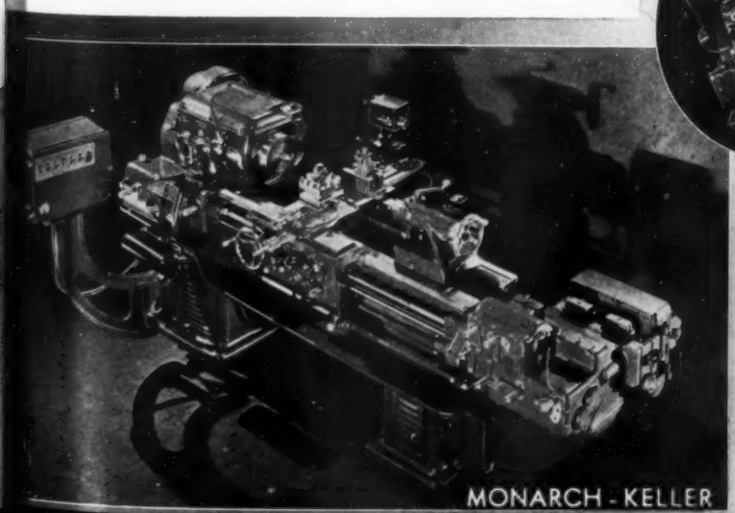












THE MONARCH MACHINE TOOL CO., Sidney, Ohio, U.S.A.

MONARCH LATHES
COVER THE TURNING FIELD
SIDNEY... OHIO, U.S.A.

Pittsburgh Sales Office 604 Chamber of Commerce Building
Chicago Sales Office: 622 West Washington Boulevard
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Modernize wit Monarch!

LIVE ACTION!

adequate Range, adequate Power

Why must every correctly designed bolted assembly include a device possessing all three of these essentials? Because it must combat the unceasing forces of wear and vibration. It must have *Live Action*—constantly functioning with adequate power over a sufficient *range*. Only a *helical* Spring Washer fulfills these requirements.

SPRING WASHER INDUSTRY

616 WRIGLEY BUILDING • CHICAGO • ILL.

THERE IS BACKBONE in K&T MILWAUKEES

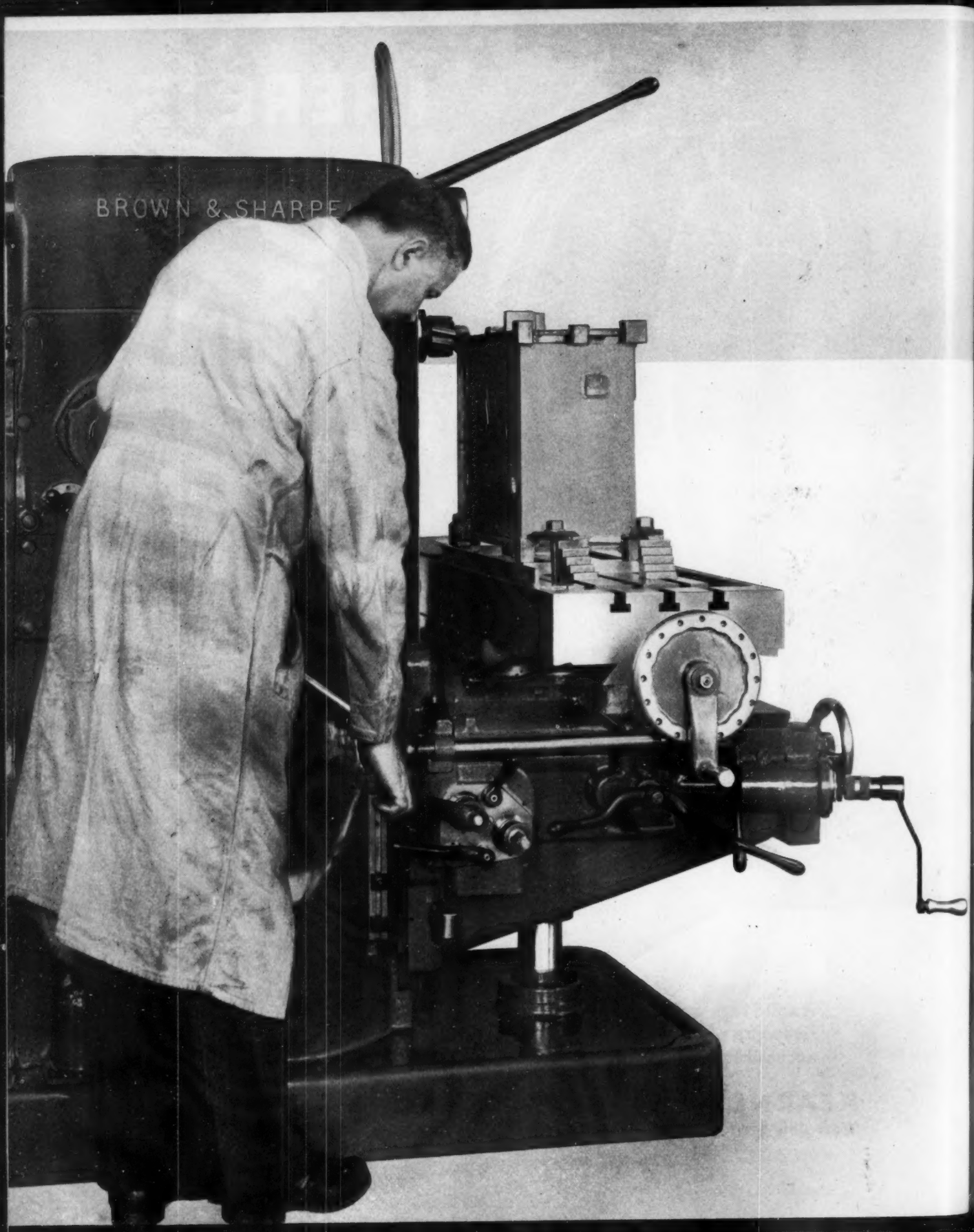
A solid rear wall . . . as logical as a solid front face . . . carries extra rigidity from the top to the broad base. Motor is accessible from sides. Standard on all Models H and K.

KEARNEY & TRECKER CORPORATION
West Allis Station MILWAUKEE, WISCONSIN

MORE THAN 39 years OF DOING ONE THING WELL

K&T

Milwaukee MILLING MACHINES



BROWN &

—*Every Feature for* PROFITABLE PRODUCTION

on the DUAL CONTROL TYPE

✓ **All Controls** — power and hand — at both **Front** and **Rear**

✓ **High** speed range

✓ **Wide** feed range

Available in Nos. 2 and 3 Sizes . . . both Universal and Plain. May we send specifications of these **modern** milling machines?

Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.

Handy Controls at rear **save time** on jobs like illustration.

B·S

G SHARPE

UNI

TWIST DRILLS • END MILLS • REAMERS

NEW YORK STORE:
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REPRESENTATIVES THROUGHOUT THE WORLD

UNION TWIST DRILL CO.

UNION

THE COMPLETE *Line of* MODERN CUTTING TOOLS

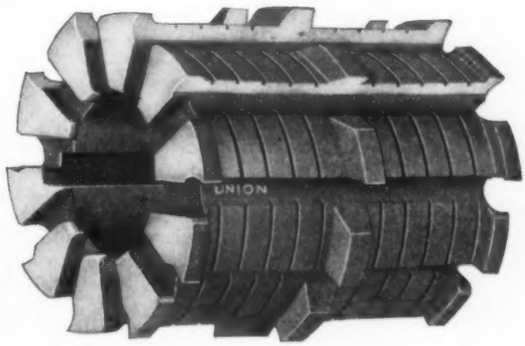
MILLING CUTTERS • GEAR CUTTERS • SLITTING SAWS

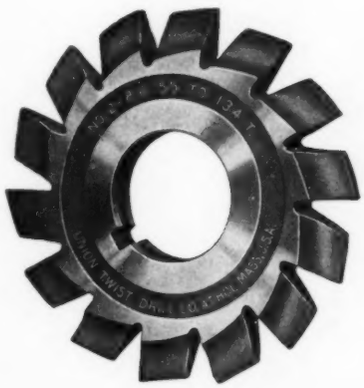
"The Tools you buy again"

The cutting tools you buy should be given the same care in selection as the machines in which they are to be used.

Careful consideration of the Union Line of Modern Cutting Tools will reveal many opportunities for savings. In addition, Union offers Taps, Dies and Screw Plates through its Card and Butterfield Divisions.

Special tools available promptly and at reasonable prices.





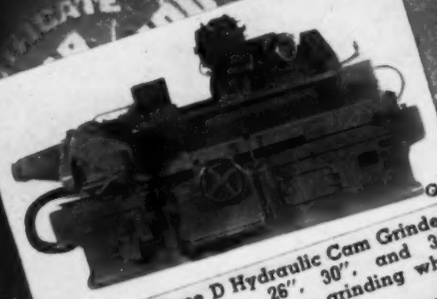
Athol, Massachusetts, U. S. A.

GOOD INVEST

LANDIS

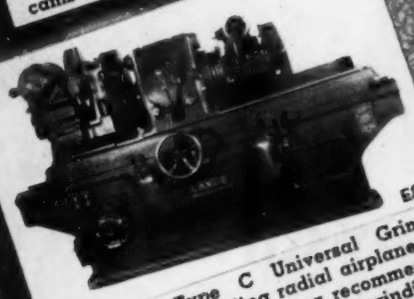
Money is not spent for modern Landis Grinders, it is invested in them.

Sixteen gilt edged investments are illustrated on these two pages. They are representative of almost 150 offered by the Landis Tool Company. The assortment is so complete and the Landis experience so extensive that almost regardless of



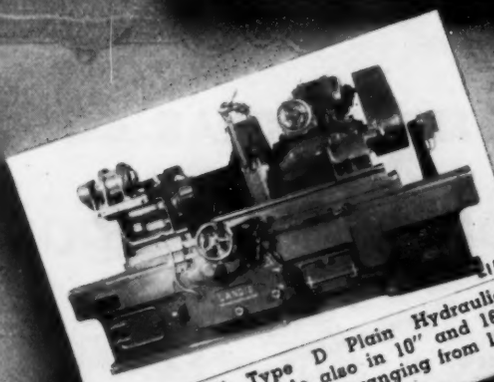
Q1

5" x 40" Type D Hydraulic Cam Grinder, available also in 26", 30", and 36" lengths. For cam contour grinding when cams are integral with shaft.



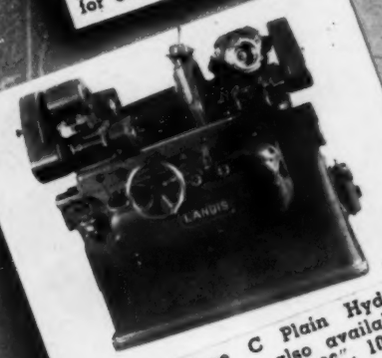
E80

14" x 36" Type C Universal Grinder equipped for grinding radial airplane engine cams. Similar tooling recommended for other forms of loose cam grinding.



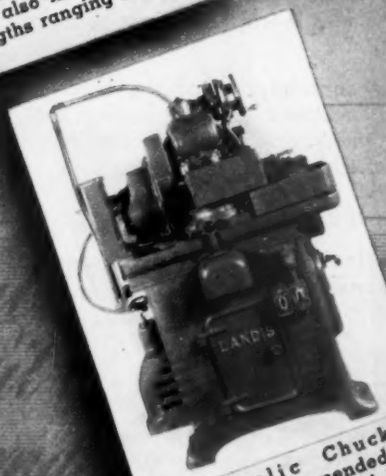
L151

14" x 36" Type D Plain Hydraulic Grinder, available also in 10" and 16" swings and in lengths ranging from 18" to 72".



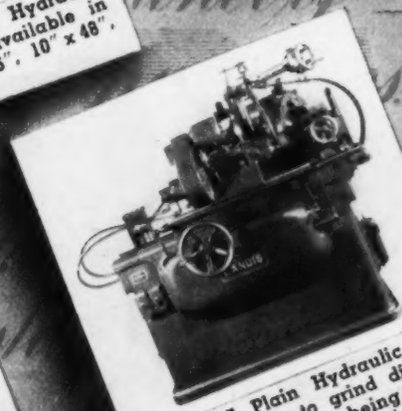
L169

6" x 18" Type C Plain Hydraulic Grinder, this type also available in 6" x 30", 10" x 18", 10" x 36", 10" x 48", and 10" x 72" sizes.



L6

Hydraulic Chucking Grinder. Recommended for the rapid grinding of small parts which are chucked rather then held between centers.



L138

Type C Plain Hydraulic with special tooling to grind differential side gears, this being typical of the large amount of special tooling available.

L134

Type C Hydraulic Valve Face Grinder. Suitable for production grinding of a wide variety of valve sizes.

R115

60" x 312" Type 30 Roll Grinder. Available also in 36", 48", and 52" swings and 120" to 312" between centers depending on the swing.

LANDIS TOO

WAYNESBORO,

MENTS — ALL

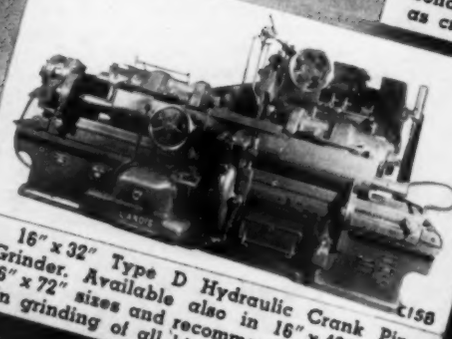
PRECISION LANDIS GRINDERS

your precision grinder needs, there is a Landis which will give satisfactory returns in the form of better work at less cost.

All we ask is the opportunity to show you the investment possibilities of Landis equipment based on your own specific grinding problems.

28" x 120" Type B Hydraulic Roll Grinder. Available either as a plain machine or roll grinder and also in 16", 20" and 24" swings and in a variety of lengths. J1

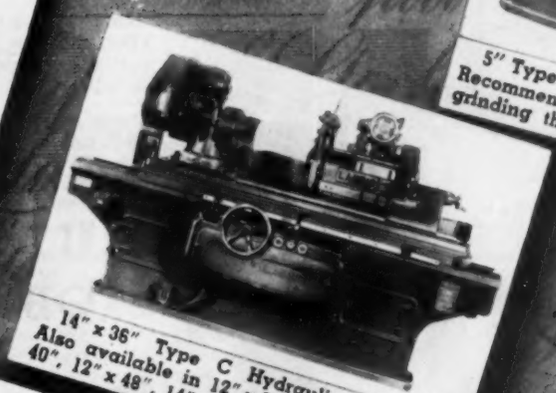
18" x 66" Type C Hydraulic Crankshaft Regrinding Machine. Recommended for the reconditioning of numerous automotive parts such as cranks, pistons, wrist pins, etc. S16



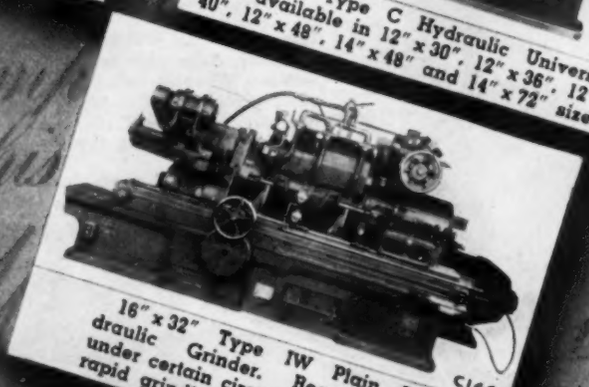
16" x 32" Type D Hydraulic Crank Pin Grinder. Available also in 16" x 42" and 16" x 72" sizes and recommended for crank pin grinding of all kinds. C158

5" Type C Hydraulic Piston Grinder. Recommended for relieving pistons or grinding them round. F23

10" x 24" Type C Hydraulic Universal Grinder. Recommended for tool room or light manufacturing operations requiring a universal type of machine. G97



14" x 36" Type C Hydraulic Universal. Also available in 12" x 30", 12" x 36", 12" x 40", 12" x 48", 14" x 48" and 14" x 72" sizes. J12



16" x 32" Type IW Plain Hydraulic Grinder. Recommended under certain circumstances for the rapid grinding of multi-diameters. C162

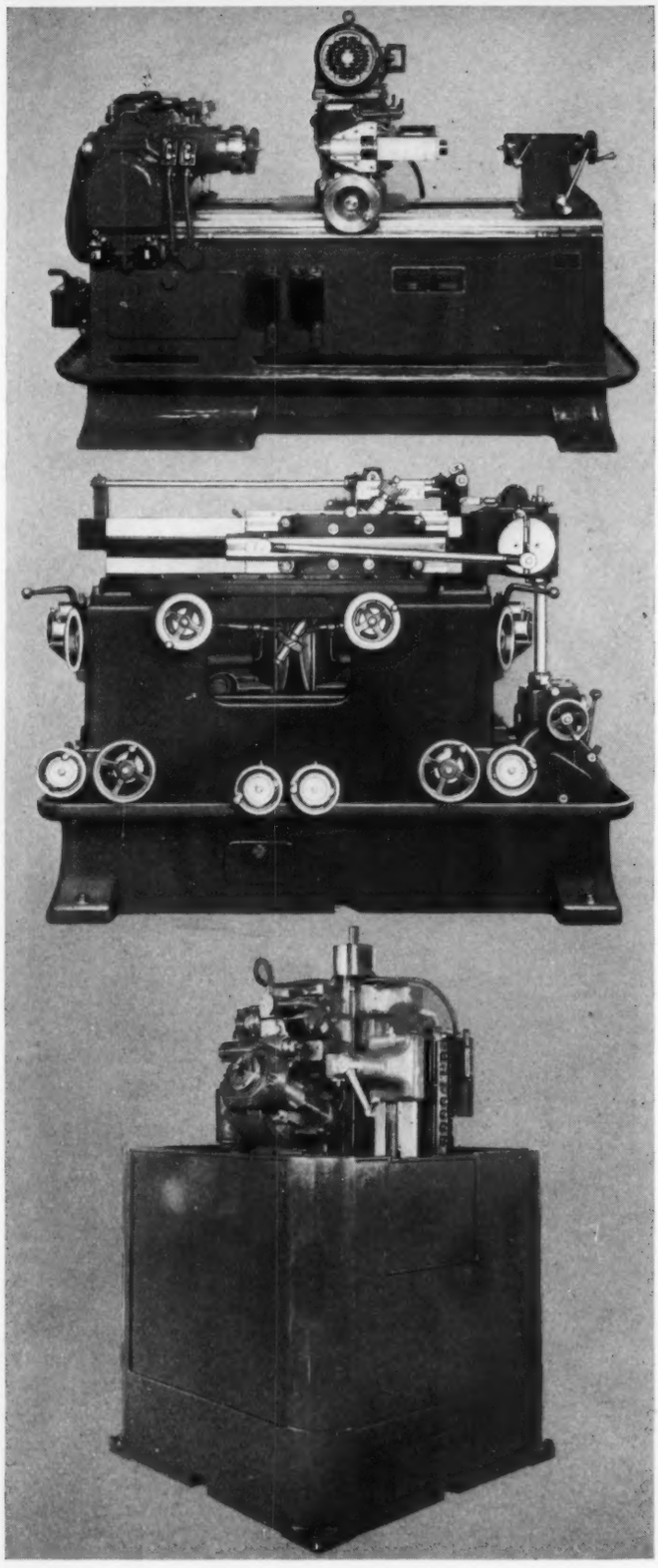
12" x 28" Universal and Tool Grinder. Recommended for practically every precision grinding operation it is necessary to perform in the tool room. K4

L COMPANY
PENNSYLVANIA.

NO. 259

LEES-BRADNER

A complete line designed



New THREAD MILLERS

The recently introduced LT Thread Miller (shown at the left) is built in two sizes to take work up to 6″ in diameter and capacity lengths of 36″ and 72″ between centers. It has a rated cutting capacity of 1″ circular pitch and a 3″ diameter hole through collet, work spindle and tailstock.

Standard equipment includes: individually motor driven coolant pump, assuring an ample supply of coolant at all times irrespective of spindle speeds, wrenches, set of cutter speed gears, set of lead and feed gears, collet (diameter capacity as specified), driving dog and center, tailstock center, one dividing plate with twenty-four divisions and follow-rest together with quick acting tailstock.

Model HT Thread Miller is a larger machine, taking work up to 12″ in diameter and capacity lengths of 4′ 6″ and 8′ 6″ . . . 2½″ circular pitch and 6″ diameter hole through collet and work spindle.

GEAR GRINDERS

The Model 2 HS Gear Grinder (illustrated at the left) will grind spur gears and either right or left hand helical gears having a helix angle up to and including forty-five degrees.

The Model 10B Gear Grinder (not illustrated) is built to handle spur gears only.

Gears in modern equipment, such as those used in automobiles, machine tools, and similar instances require extreme precision to insure quiet running qualities and the necessary strength.

These results can be best obtained by grinding the gear teeth on a Lees-Bradner Gear Grinder, after hardening.

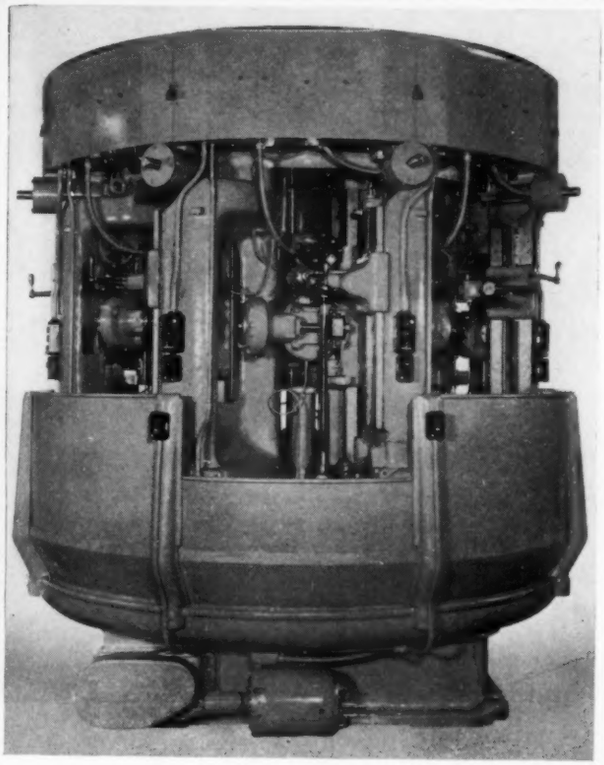
AUTOMATIC GEAR HOBBING MACHINE

Single Spindle

This new model will economically produce gears of maximum accuracy. Adaptable to a wide range of work, viz: Spur Gears —Worm Wheels—Helical Gears up to 45 degrees right or left hand—Spline Shafts—Straight or Taper Serrations. Made in two sizes for 7″ and 12″ maximum outside diameter of work, up to 9″ face and 4 D.P. in steel. Note following features:

- **The automatic depth feed against a positive micrometer stop insures uniformity of diameter.**
- **Clearing work for the return stroke avoids drawing cutter back through the cut.**
- **Operator does not have to operate a quick return or approach, as the machine does this automatically.**
- **Operator does not have to back cutter out of work at completion of cut, as the machine does this automatically.**
- **This automatic operation provides operator with ample time to handle several machines, since all he does is load and unload the work in the machine.**

for Larger Profits thru Better Production!



HOBBING MACHINES

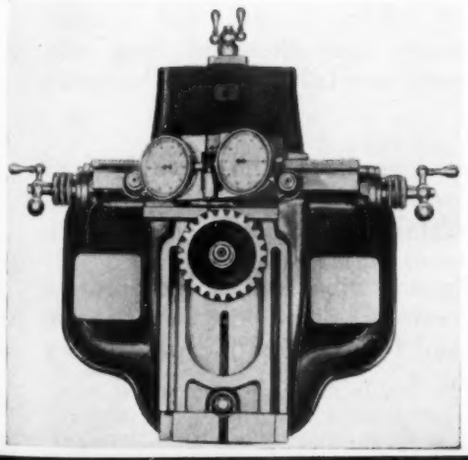
Rotary Type

Lees-Bradner Rotary Type Hobbing Machines are adaptable to a wide range of work, such as Spur Gears—Worm Wheels—Helical Gears up to and including a helix angle of forty-five degrees, right or left hand—Spline Shafts—Straight or Taper Serrations.

These machines are fully automatic in their cycle of operation; all that the operator has to do is to load and unload the work.

GEAR TESTERS

Recommended and used for testing errors of Tooth Contour—Arc of Action—Tooth Spacing—Concentricity—and Length of Line of Action. It incorporates use of the basic principle—rolling a base circle along a straightedge to describe an involute curve. This is by far the simplest, most positive and accurate method of locating and measuring errors of gear teeth. By locating the nature of the error, and measuring it accurately in .0001 parts of an inch, you can quickly and positively correct your gear tooth troubles.



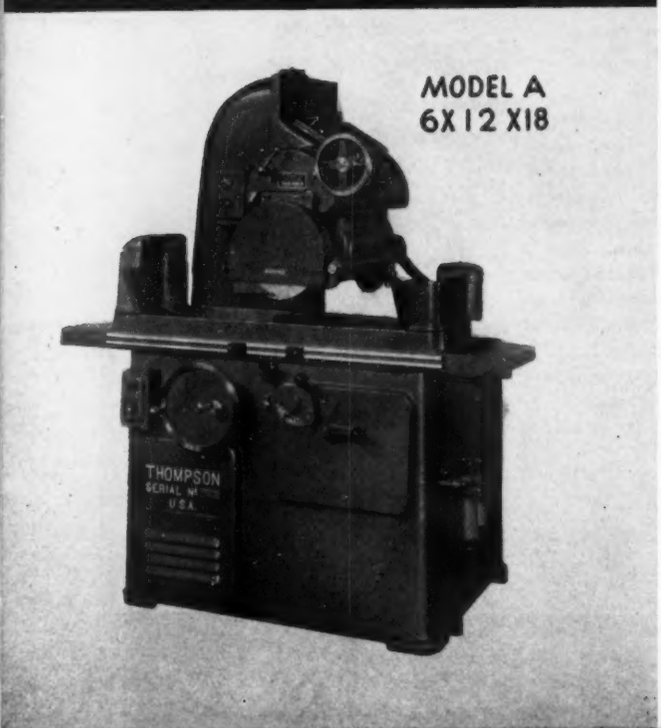
(LEFT) Plan View of set up for testing Involute Curve

(RIGHT) Gear Tester set up for testing Involute of Helical Gear

The LEES-BRADNER *Co.*

Manufacturers of Thread Milling Machines, Single Spindle Gear Hobbing Machines, Rotary Hobbing Machines, Gear Grinders and Gear Testers

CLEVELAND, OHIO, U.S.A.



Hydraulic Grinders for Today's Needs!

And the needs of today call for accurate flat surfaces obtained with a minimum expenditure of time and effort. These requirements are fully met by Thompson Hydraulic Grinders.

Smooth hydraulic power permits a high table feed of 100 ft. per min. This, with the proper wheel, produces a finish not previously obtainable on a production basis.

Automatic wheel truing and vibrationless motor drive are two more of many features you ought to investigate. Made in several sizes and types. Get the whole story by writing us for a booklet.

THE THOMPSON GRINDER COMPANY
Springfield, Ohio, U.S.A.

THOMPSON

New 8" Porter-McLeod Cold Metal Sawing Machine

Modern, Clean Lined, Compact — Higley Type

Enclosed motor driven unit, having controls centralized for operating convenience.

This machine is recommended for general work and for production work in single or multiple units. Its capacity permits of "nesting" economical quantities of bars or shapes using our systems of "multiple or interchangeable nests" which give support to each nest on both sides and bottom, with the clamping pressure exerted at top. This insures rigid holding of all bars in the nest, a very desirable condition.

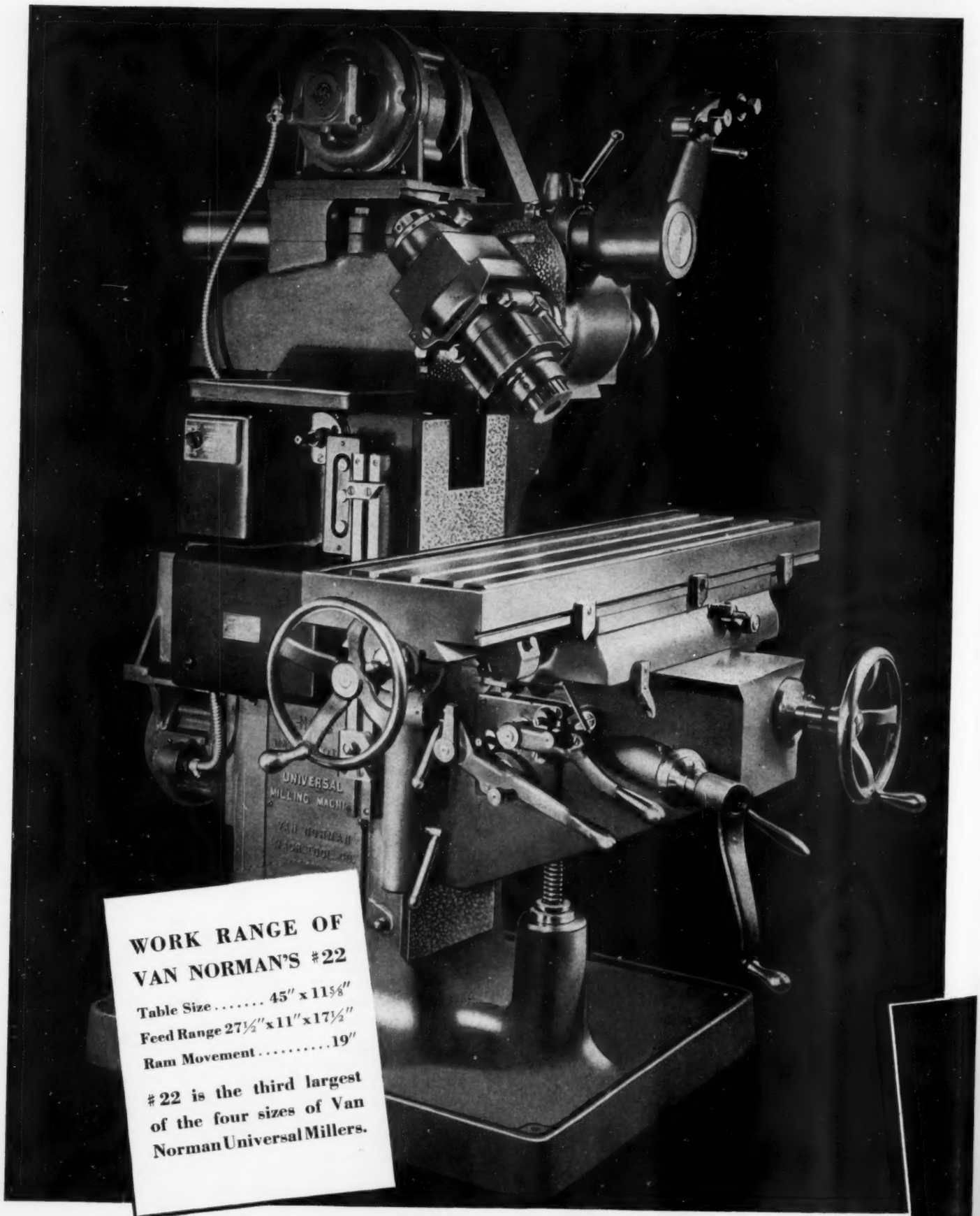
Adjustable bumper for swing frame not only relieves the gravity drop but positions the blade for the next cut.

We have an adjustable blade support which allows the use of blades of different thicknesses and gives better support than ever before. The adjustment is readily and easily made when changing from one thickness of saw plate to another.

Feed of blade is upward to the stock. This is blade protection against riding or bumping the stock. The blade carrying swing frame fulcrums on a heavy bronze bushing held rigidly in the main frame of machine and on frontside is trunnioned in an outboard bearing. The elevating quadrant and spur pinion are of steel and cut double helical teeth. Feed is by friction disc, which is insurance against blade breakage, especially when hard spots are encountered in stock being cut.

Write for descriptive Bulletin and Prices

Porter-McLeod Machine Tool Co., Inc. Hatfield, Mass.



WORK RANGE OF VAN NORMAN'S #22

Table Size..... 45" x 11⅝"
Feed Range 27½" x 11" x 17½"
Ram Movement.....19"

#22 is the third largest of the four sizes of Van Norman Universal Millers.

VAN NORMAN MACHINE TOOL COMPANY

THE "BEST TIME OF HIS LIFE" is in store

for any machinist who goes to work on a Van Norman Universal Miller. For one thing, he'll get more work out of his day . . . for another, he'll get more satisfaction out of his work, which he can easily make more accurate, less "nervous," more profitable to his employers. For he won't have to fuss with a lot of indicating and adjustments that take up almost half his time now. The original set-up *stands* 'til most jobs are through . . . *because the swivelling cutterhead can be quickly reset, instead, to work at any angle.* This flexibility is saving errors and rejects—increasing output—in toolrooms, contract and pattern shops, laboratories, and on short production runs. Write for information on the four models of Van Norman Universal Milling Machines, and also ask for the new bulletin on "Milling Attachments & Accessories."

VAN NORMAN Universal Millers

SPRINGFIELD, MASS., U. S. A.

The New Industrial Dictionary

(Third Revised Edition)

Old words have new meanings these days. It will pay every manufacturer to learn the new definitions

com'pe-ti'tion—The low-cost plant (there's one in every industry) which can undersell you.

field—en'gi-neer'—Warner & Swasey representative who can help you find ways to cut costs on your turning work.

fu'ture—Time when plants who modernize now will be in position to reap greatest rewards.

in-vest'ment—Money spent which returns a profit. Investors in new Warner & Swaseys report average of 20% net profit per year.

mod'ern-ize—Act of putting yourself in position to compete with low-cost competitor.

op'er-a'tor—Individual you would like to cooperate with. Method: give him equipment that is less tiring, lets him show his skill, lets you both earn a profit on whatever production you have.

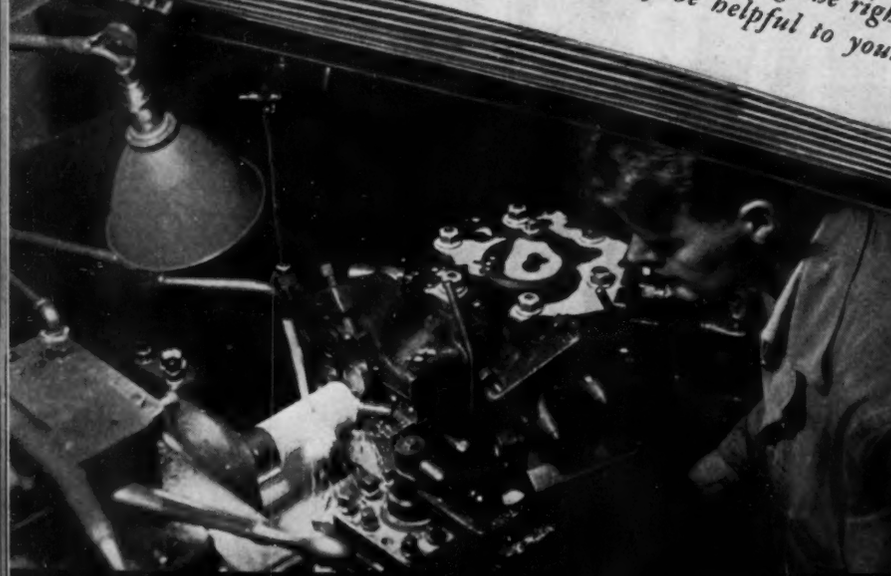
prof'it—What is left after costs are paid. Obsolete word in out-of-date plants; used daily in modern plants.

re-ces'sion—Period in which business goes to plants where modern machinery makes possible low cost and precision workmanship.

stock'hold'er—Worried, drooping individual. To revive: increase profit by cutting costs.

tax—(generally pronounced *!-!-?-!-*-!!) Weakness which can prove fatal. Cure: strengthen profit margin by reducing costs, best done by replacing wasteful equipment.

If these and similar words are worrying you, perhaps our experience with other plants in applying the right meaning in the right place may be helpful to you.



WARNER & SWASEY
Turret Lathes
Cleveland

You can turn it better, faster, for less—with a Warner & Swasey

AMERICAN MACHINIST

ESTABLISHED 1877

F. H. COLVIN • K. H. CONDIT • BURNHAM FINNEY, Editors

Planning for the Plant

THE COLUMNISTS who are hired by the big newspaper syndicates to do our economic thinking for us, the Dorothy Thompsons, the Walter Lipmanns and the Hugh Johnsons, are predicting that we are going much farther in the direction of national economic planning than we have already gone. Mr. Roosevelt's current conferences with business and labor leaders support these forecasts.

As economic planning develops, the planners are going to discover what a terrific burden of obsolescence we are carrying in this country. Our merchant marine is 85 per cent obsolete, our railroad locomotives are almost as bad, and 61 per cent of our machine tools are over ten years old and therefore open to the suspicion of being inefficient.

Certain observers in Washington believe that the inroads made by German firms into our South American trade have been made possible by the modernization programs stimulated by the German government in German shops. If they are correct our own government should study the effects of some of its policies on equipment in American shops.

One other important factor that cannot be ignored is readiness of our manufacturing plants to play their part in national defense. The President and Secretary Hull have warned us that we may not be able to insulate ourselves from war, and that dangerous situations exist in more than one part of the world. Obsolete or otherwise inadequate machine tools and other shop equipment would prove to be a serious handicap if trouble should overtake us.

ALL OF THESE MATTERS combine to concentrate the attention of management on equipment. This 25th Review and Catalog Number of *American Machinist,* always a popular service to the industry if we may judge from the letters that reach us, is particularly useful right now. This year's issue contains a sixth more items than last year's, and it has been revised in several essentials to make it a more practical working record of advances in the art. For the first time, the different types of shop equipment have been classified and segregated, and the corresponding advertisements have been grouped in the same subdivisions of the magazine. Separate analyses of developments in each of these thirteen groups are printed on tinted stock inserts that head the respective sections. The issue, as a whole, is offered to *American Machinist* readers as a tool to be used throughout the year for reference where equipment is the subject of discussion and where management has a will to modernize.

Gaging Business

GAINS IN SOME metal-working industries have been offset by losses in others with the result that conditions today are about what they were two weeks ago. Steel output is up a few points to 29 per cent and mills hope for a slow, steady rise to a peak of 60 per cent or more in the Fall. Car makers figure they will be doing well if they make three million units this year. Assemblies have increased a bit, but accumulated stocks have forced some parts companies to reduce operations. Electrical manufacturers look for a further dip before an upturn.

The supply trade is flat, the volume being down to the 1932 level. Tool and die shops are confident of considerable business soon because of extensive automobile design changes for 1939. Machine tool builders continue to derive some comfort from foreign sources, while domestic sales lag. Dealers complain that little improvement, except from automobile makers, appears likely the next two months. From all over the country come reports that many expansion plans are being held in abeyance until the government's course becomes clearer.

CHICAGO—Industrial activities are slow. Steel sales are meager with agricultural implement companies the leading buyers. Entrance of several firms into the small tractor market, expansion of Electro-Motive Corp. and Mechanics Universal Joint Co. and release of machinery for the new International Harvester and Stewart-Warner plants at Indianapolis are considered forerunners of recovery in the near future. Machinery inquiries are keeping dealers busy.

BOSTON—Political uncertainties continue to be a brake on business. Half-time operations prevail in metal-working plants, with some companies splitting shifts instead of letting men go. Electric utilities are planning expansion and cotton textile mills are more active. Naval Torpedo Station at Newport and electrical makers are expected to buy equipment. Airplane builders are busy.

PITTSBURGH—Steel operations are slowly trending upward, but buying will be very light until second quarter prices are clarified. Ford and General Motors have placed attractive tonnages. Now around 30 per cent, the steel industry must get up to about 45 per cent before it will make money again. Electrical industry expects a further decline in employment before an increase occurs. Machine tool orders are meager.

CINCINNATI—Foreign machine tool business is good and domestic orders poor. General Motors divisions at Dayton are running three and four days a week with 19,000 on payrolls compared with 23,000 two months ago.

DETROIT—Car makers should place much equipment business in the next 90 days. Current volume in the supply trade is as low as during the worst years of the depression. Toledo metal-working plants are getting a few more auto releases. It is believed that February releases will come through in greater volume.

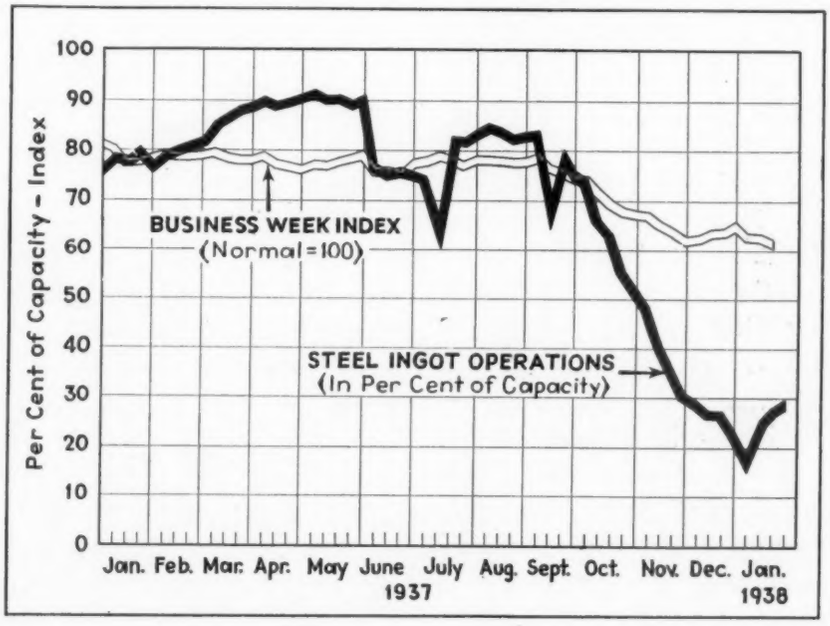
SAN FRANCISCO — Equipment purchases have been small with most buyers adhering to a policy of watchful waiting. Surveying electric utilities, *Electrical West* finds that western companies, with 81 per cent of the region's generating capacity, will spend over 20 per cent more this year than last for plant expansion. The percentage increase will be far greater than the national average.

NEW YORK—Export machinery requirements continue to promise more business than the domestic market does. Inquiries, however, are numerous and sentiment is slightly better than it was a few weeks ago.

CLEVELAND—Machinery dealers say that January sales have been considerably larger than those in December, but this doesn't mean much because last month's total was so low.

STEEL OUTPUT VS. GENERAL BUSINESS

Prince or pauper—steel must be one or the other. General business and steel started 1936 at about the same level, but a year later finds steel trying to climb out of the dog house



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FREE - HOW TO CUT COSTS

ON PARTS PRODUCED ON AUTOMATIC SCREW MACHINES

Mail the coupon!

Conomatics and Cone Automatics are made in 9 sizes, from 4 to 8 spindles, and are economical producers of screw machine parts up to 6″ diameter and 7″ milling length.

Because of their unique design, rugged construction, flat slides, tools readily accessible —no cams in the way of the operator—they are real production machines.

If you are interested in cutting costs, you should be interested in these machines. Send for catalogs today. No obligation.

Please send the following catalogs which will help me reduce costs on parts produced on automatic screw machines.

Name _____ *Title* _____

Company _____

City _____ *State* _____

CONE AUTOMATIC MACHINERY CO.
WINDSOR, VT., U. S. A.

Machine Tools

DURING 1937 the development of new machines and the improvement of previous designs, as measured by the number of items reviewed during the year, proceeded at an accelerated pace. This annual review describes 790 metal-working and accessory items, whereas the total for 1936 was 637 and that of the previous year was 640.

Attention is being directed, as never before, to developments that both increase the metal-removing capacity of machine tools and decrease the effort required to control their operation. Operator fatigue, simplicity of control, between-cuts time and work-holding devices are being given careful consideration in practically all design offices.

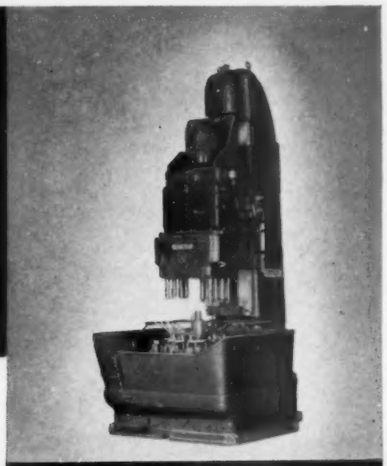
Of the 790 items described in these pages, 171 items, or 21.6 per cent of the total, are metal-removing machines of one type or another. These include boring and broaching machines, cut-off and filing machines, drilling units of various types, gear cutting and finishing machines, grinding and honing machines, lathes and screw machines, milling machines, planers and shapers, tapping and threading machines.

Requirements for increased power and improved rigidity, features necessary for the economic application of the continually improving metal-cutting alloys, are being met by these new machine tools. Machine parts are made from carefully selected materials, heat-treated to close specifications; anti-friction bearings are still finding new points of use.

Closer tolerance requirements for the finished product are being met by machine-tool manufacturers by the provision of accurate measuring devices where needed. One line of horizontal boring, drilling and milling machines, announced during the year, has micrometer dials and vernier scales for all adjustments of the spindle, head, column, and table. Provision also is made for fitting indicator dials for accurate pin and gage-block setting of all adjustments on these machines.

Automatic-cycle operation of machines used on high-production operations is featured in a number of the units announced during the year. This relieves the operator of many of his former duties, making it necessary for him only to load and unload the parts and make an occasional check for accuracy. This is particularly true of a number of the gear cutting and finishing machines,

MODERN MACHINE TOOLS



DRILLING

DRILLING

Sipp Sensitive Drills • High Duty Drills • Independent Feed Drills • Cam and Hydraulic Feed Single and Multiple Spindle Way Drills • Special Drilling Machines.

BORING

BORING

Hydraulic or Mechanical Stub and Piloted Bar Cylinder Boring Machines • Way Boring Machines • Special Boring Machines.

TAPPING

TAPPING

Lead Screw and Hand Feed Single and Multiple Spindle Way Tapping Machines • Nut and Coupling Tapping Machines.

SURFACE BROACHING

SURFACE BROACHING

Single Slide Hydraulic Surface Broaching Machines • Duplex Hydraulic and Mechanical Surface Broaching Machines.

THE FOOTE-BURT COMPANY

CLEVELAND, OHIO

Detroit Office:
4-151 General Motors Bldg.

Chicago Office:
565 Washington Blvd.

FOOTBURT

Machine Tools *(Continued)*

one of which is magazine fed, has a full-automatic cycle and deposits the hobbed gears into a chute which delivers them to tote pans.

Most special-purpose machines are now designed to use standard units which can be rearranged to suit any revisions in product design. In other cases, standard machines are so arranged that they can be used economically for large-quantity production and still be adaptable for small-lot manufacture.

Improvements in the fields of internal and surface broaching continue. A dual-ram surface broaching machine of 3-tons capacity was developed for broaching the joint faces on automotive-engine connecting rods and caps. Operation is hydraulic throughout, including fixtures and clamping operation, and the operator has only to place and remove the parts. The machine operates continuously and a production of 400 rods and caps per hour is claimed.

Gear Finishing Methods

The enveloping process of gear finishing, for which a machine was announced, differs from conventional methods in that tool and work are rotated together without control of any indexing mechanism and cutting is accomplished by using pressure to maintain contact between tool and work. Tools are rotated at high speed and traversed at slow speed. Another gear finishing machine passes the gears, which are mounted between centers, between two crossed-axis cutters. These cutters can be used independently to finish simultaneously two gears of different characteristics on a cluster or both sides of a herringbone gear. The cutters are separately adjustable.

These machines and other gear finishers described on the following pages reflect the increasing attention being given gear cutting and finishing practice, particularly in connection with gears for automotive transmissions. Directly in line with this activity is the cross-axes gear-lapping machine. This unit has two laps which may be used either for lapping front and back sides of the teeth of a gear simultaneously, with the machine running in one direction only, or may be set to lap each of two cluster gears. An automatic mechanism controls the lapping cycles with automatic reverse to provide for lapping both sides of gear teeth where necessary.

Automatic Grinders Offered

Grouping of controls to make operation easier is featured in a number of both cylindrical and surface grinding machines. One of the cylindrical units is fully automatic and is arranged for plunge-cut operation. Normal capacity of this machine is a part 10 in. in diameter and 18 in. long. Another machine, available in 3x12 and 5x18-in. sizes, is offered for rapid cylindrical grinding of duplicate small parts on a production basis.

A combination of oscillating and rotating feed principles is used in a large abrasive cut-off machine announced early in the year. This method of feed, combined with massive construction and proper distribution of coolant is claimed to produce smooth, true-to-size cuts in practically any material, with a minimum of butt. Operating conditions are predetermined to insure best results. A "job-selector" dial provides data on proper saws and speeds for sawing 48 different materials on a contour band saw offered in several sizes. These machines have weight-actuated power feeds and a saw speed range from 50 to 800 ft. per min.

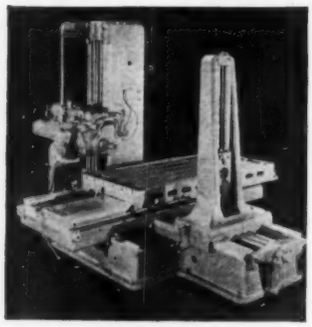
Boring Machines—Broaching Machines—Cut-off and Filing Machines—Drilling Machines—Gear Cutting and Finishing Machines—Grinding and Honing Machines—Lathes and Screw Machines—Milling Machines—Planers and Shapers—Tapping and Threading Machines—Miscellaneous Machines

BORING MACHINES

Boring, Drilling and Milling Machine, Horizontal, Table-Type

William Sellers & Co., 1600 Hamilton St., Philadelphia, Pa. (Vol.81,p.1226.)

Using the same head as the No. 504 Type A floor-type horizontal machine, the No. 504 Type C table-type boring, drilling and milling machine features a complete power unit from the motor to the spindle nose in the unit head. Tables are available in sizes ranging

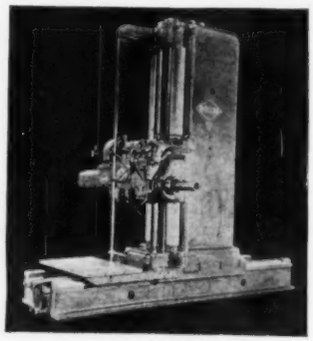


from 36 x 72 in., up to 60 x 120 in. Specifications: diameter of spindle, 5 in.; spindle feeding stroke, 36 in.; maximum distance from center of spindle to top of table, 60 in.; range of spindle speeds, 5.8 to 334 r.p.m.; range of feeds to spindle, head, table and saddle, per revolution of spindle, 0.0025 to 0.625 in. Precision measuring equipment is available.

Boring, Drilling and Milling Machine, Horizontal, Floor-Type

William Sellers & Co., 1600 Hamilton St., Philadelphia, Pa. (Vol.81,p.1109.)

Head of the floor-type horizontal boring, drilling and milling machine is a complete power unit containing the forward and reverse driving clutches, all speed and feed changes and hand and power traverse to both spindles, head, saddle and table. Driving motor is mounted on the head. A micrometer dial is provided on the front of the head, beside the spindle, for accurately positioning the spindle. Another micrometer dial, beside the pilot wheel, provides for final positioning of the head



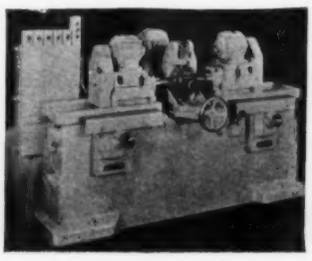
and column from the operator's platform. Hand adjustment, with a micrometer dial, is provided at the base of the column for positioning column on the runway.

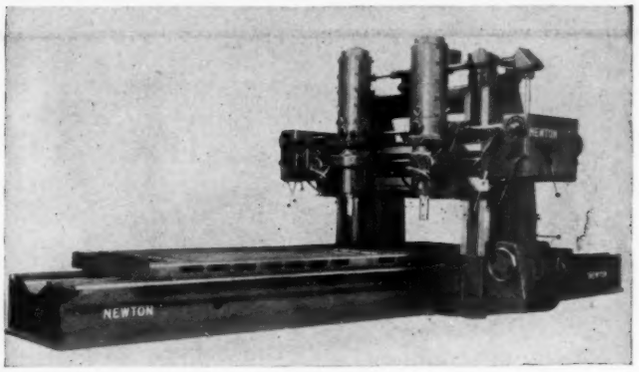
Specifications for the 5-in. No. 504 Type A machine shown include: diameter of spindle, 5 in.; stroke of spindle, 36 in.; vertical travel of head on column, 72 in.; range of main spindle speeds. 5.8 to 334 r.p.m.; range of feeds per revolution of spindle, 0.0025 to 0.625 in. Where an auxiliary spindle is furnished, this spindle has fourteen speeds ranging from 100 to 1,000 r.p.m.

Boring Machines, Two- and Three-Way

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich. (Vol.81, p.1054.)

Designed for multiple boring, facing and turning operations in high-production operations, this line of two- and three-way boring machines can be arranged with from two to nine spindles. Multiple fixtures can be used. Boring spindles, with their individual motor drives, are separately mounted on sliding tables. Table feed is hydraulic. Spindles are universally adjustable, vertically, axially and tranversely. Holes ranging from $\frac{3}{8}$ to 6 in. in diameter may be bored. Maximum table travel is 12 in.

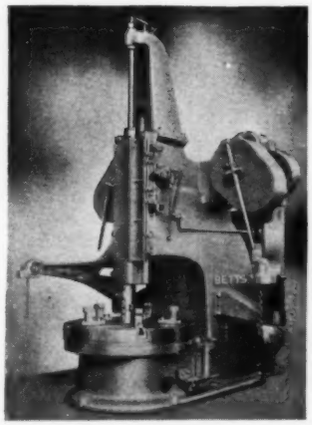




Boring and Drilling Machine, Planer-Type

Consolidated Machine Tool Corp., Rochester, N. Y. (Vol. 81,p.1049.)

Arranged for precision drilling and boring of large frames where numerous holes must accurately be positioned, this planer-type drilling and boring machine is offered in a wide range of sizes. Both heads and table are provided with handwheels for precision positioning. They also are fitted with end measures, inside micrometers and dial indicators. Boring bars have vertical power rapid traverse and heads have rapid traverse across the rail.



Boring Machine, Car-Wheel

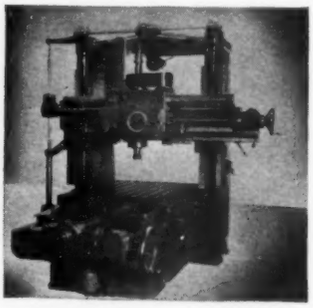
Consolidated Machine Tool Corp., Rochester, N. Y. (Vol.81, p.583.)

Automatic cycle operation has been developed for the Betts hydraulic feed car-wheel borer. After the operator loads the wheel on the table, he starts the machine. This automatically tightens the chuck jaws and starts the automatic cycle of operation. Machine is suitable for all sizes of cast-iron and steel car wheels up to 42-in. diameter and can be arranged to chuck 48-in. wheels if required.

Boring Machine, Jig, Precision

Cleveland Universal Jig Co., 13404 St. Clair Ave., Cleveland, Ohio (Vol.81,p.423.)

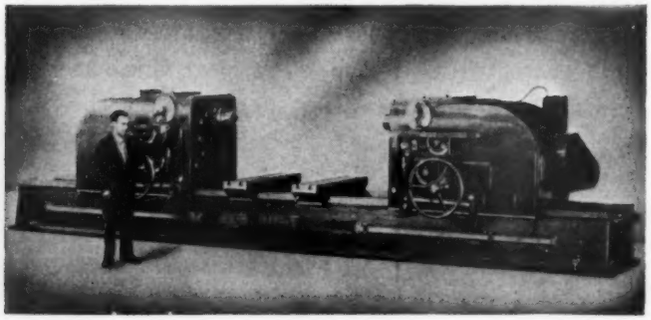
Type 48 precision jig boring machine has a base of box-type design, ribbed to eliminate vibration. Table has a 40 x 60 in. working surface. Table longitudinal traverse screw is fitted with a 6-in. vernier dial, graduated to 0.001 in. A vernier slide runs the entire length of the table. Spindle drive is by a 7½-hp. motor through a Transitorq.



Boring Machine, Two-Way

Defiance Machine Works, Defiance, Ohio (Vol.81,p.143.)

This heavy-duty, horizontal, two-way boring machine is in-



tended for boring, facing and counterboring large castings at opposite ends. Spindle heads have independently controlled drives. Twelve spindle speeds, ranging from 8 to 225 r.p.m. and four feeds, ranging from 0.0078 to 0.0625 in. per rev. of the spindle, are available. Machine bed is 25 ft. long. Each head slide has a 6 ft. movement on the bed, with maximum distance between spindle noses of 12 ft.

BROACHING MACHINES

Broaching Machine, Type PD, Internal

American Broach & Machine Co., Ann Arbor, Mich. (Vol.81, p.672.)

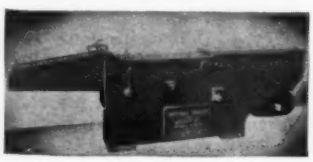
Designed especially for rapid, accurate internal broaching, the Type PD hydraulic broaching machine is claimed to be easily set up and can be operated at high speed with safety.

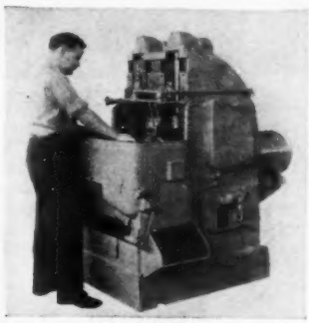
Specifications: capacity, 4 tons; maximum stroke, 22 in.; cutting speed, 30 ft. per min.; return speed, 40 ft. per min.; work plate, 7 x 12 in.; floor space, 2¼ x 4 ft.; weight, including motor, 2,500 lb.

Broaching Machines, Hydraulic, Horizontal

American Broach & Machine Co., Ann Arbor, Mich. (Vol. 81,p.717.)

Made in five sizes and designed for a wide variety of internal and surface broaching operations, the Type H horizontal hydraulic broaching machine features extra long pulling slides, hardened steel ways, automatic pressure lubrication, space-saving arrangement of hydraulic cylinders and convenient controls. Infinite variation of cutting speeds between maximum and minimum is provided. Normal capacity ranges from 6 to 20 tons and maximum capacity ranges from 9 to 28 tons. Stroke ranges from 36 in. to 60 in.

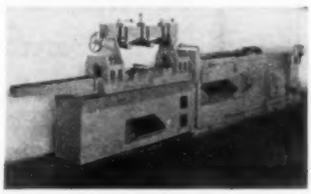




Broaching Machine, Dual-Ram Type

Colonial Broach Co., Detroit, Mich. (Vol.81,p.1172.)

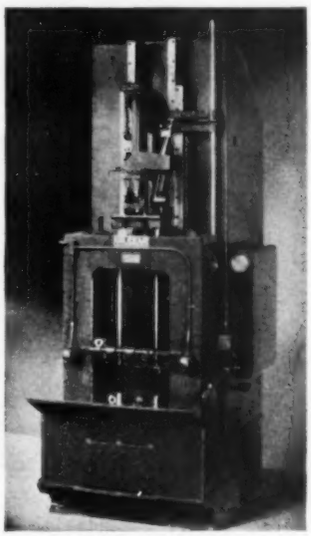
A production of 400 connecting rods and caps per hour is claimed for this continuously operating, alternating-cycle, dual-ram surface broaching machine. It has an 18-in. stroke and 3-tons capacity per ram. Designed for broaching the joint faces on connecting rods and caps, rods are broached on one ram and the caps on the other. Operation is hydraulic throughout, including fixture and clamping operation. Approximately 0.010 in. of stock is removed in the operation, with a finished tolerance of 0.0005 in. Machine is provided with a knee control.



Broaching Machine, Bearing-Seat

Colonial Broach Co., Detroit, Mich. (Vol.81,p.1286.)

Designed to broach bearing seats in an automobile engine cylinder block, this special machine consists of a standard, universal hydraulic broaching machine with fixtures built up on a separate base and bolted to the face plate of the machine. Unit is arranged so that the cylinder blocks can be slipped into place directly from the roller conveyor. Broaching is automatic, the broach being pulled through the block with a 60-in. travel of the broach heads. Ram has a capacity of 10 ton and approximately $\frac{1}{32}$ in. stock is removed. A production of 60 blocks per hour is claimed.



Broaching Machine, Vertical, Type XM-30

Oilgear Co., 1319 W. Bruce St., Milwaukee, Wis. (Vol.81,p. 143.)

Type XM-30 "Cyclematic" broaching machine is shown set up for broaching three splines in bicycle coaster-brake hub shells at the rate of 540 pieces per hour. Each cycle produces three finished hub shells or a total of nine splines, each of which is 0.285 in. wide by 2 in. long. Double push button control requires the operator to remove his hand from the work before cycle is started. This unit features a one-piece carriage, and rack and pinion type adjustment for tool handling.

Broaching Machine, Horizontal

Colonial Broach Co., Detroit, Mich. (Vol.81,p.339.)

A high-speed, horizontal, automatic pusher-type broaching machine has been adapted for broaching both ends of gear carrying rods for automobile front-seat mechanisms. Rods are loaded in a magazine at the top of the machine and are released into place automatically, two at a time. They are ejected at the end of the stroke, completely finished. Machine is hydraulically operated with a cutting stroke of 30 ft. per min., and a fast return of 60 ft. per min. Production, 600 pieces per hr.

CUT-OFF AND FILING MACHINES

Abrasive Cut-Off Machine, Type K

A. P. de Sanno & Son, 1615–23 McKean St., Philadelphia, Pa. (Vol.81,p.892.)

A two-speed motor is provided to give the abrasive wheel spindle of the Type K Radiac cut-off machine a high and a low speed. Rubber-bonded or resinoid-bonded disks are used for cutting bars, tubing and formed shapes. These disks can be flooded with coolant at both cutting speeds. Work is held on both sides of the cut under spring tension.

Abrasive Cut-Off Machine, Wet

The Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn. (Vol.81,p.1236.)

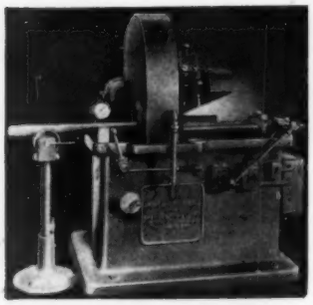
Similar in design to the No. 48 "Abrasaw" dry-cutting, cut-off machine, the wet cut-off machine has a coolant tank equipped with a suitable pump and piping for supplying cutting lubricant to both sides of the cutting disk. Specifications: Standard capacity, 2½ in. diam-

eter; size of disk, 12 in. diameter; thickness of disk, $\frac{3}{32}$ in.; spindle speed, 5,000 r.p.m.; weight, 1,020 lb.

Abrasive Cut-Off Machine, "Cutamatic"

Andrew C. Campbell Div., American Chain & Cable Co., Bridgeport, Conn. (Vol.81, p.381.)

Having capacity to cut bars of any shape of material that can be contained in a 6-in. circle, the "Cutamatic" abrasive cut-off machine utilizes a combination of oscillating and

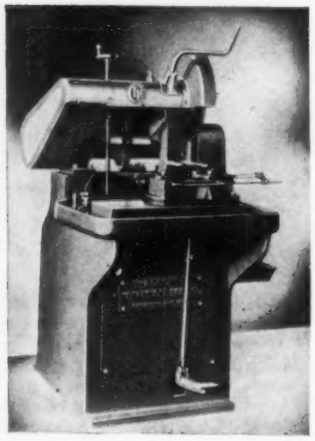


rotating feed principles which produce smooth, true-to-size cuts with a minimum of burr. Abrasive wheels used range from 10 to 20 in. diameter. Coolant is equally distributed on both sides of the abrasive wheel, thus maintaining an equal temperature. All operating conditions are predetermined.

Abrasive Cut-Off Machine

Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, Ohio. (Vol.81.p.593.)

This wet-abrasive cut-off machine for cutting practically any material encountered in gen-

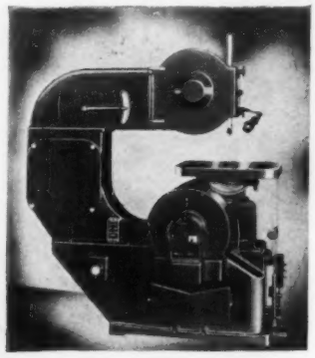


eral manufacturing is suitable for straight or angle cuts in solids up to 2¼ in. diameter or tubing up to 3½ in. diameter. In cutting angles up to 45 deg., maximum capacity is 2¼ in. Spindle is driven by V-belt from a 7½-hp. motor which is mounted at the rear.

Bandsaw, Open-End, Type OS-36

Grob Bros., Grafton, Wis. (Vol. 81,p.588.)

Work up to 8¼ in. high can be sawed on the Type OS-36 open-end bandsaw. No brazing or welding of the saw band is



required for internal sawing. Large throat is obtained by means of a third pulley mounted on a swivel block in the upright column. Saw band is driven positively. Sawing table, measuring 24x28 in., is tiltable in two directions. Distance from floor to table, 47 in.; weight, 3,000 lb.

Bandsaw, Vertical, No. 7-B

Wells Mfg. Corp., 315 Seventh Ave., Three Rivers, Mich. (Vol. 81,p.892.)

Nine speeds, ranging from 60 to 1,400 ft. per min., are provided for the No. 7-B vertical bandsaw. Upright frame

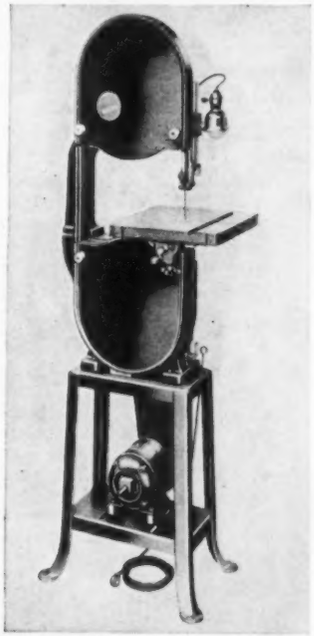
is hinged at the bottom and may be released and fed into the stock automatically. Machine has a throat clearance of 14 in. vertically and 14½ in. horizontally. Table is arranged to tilt 45 deg. right and 10 deg. left. Capacity of the saw, when in a horizontal position, is 14x18 in.

Bandsaw, Contour, "Doall Metalmaster"

Continental Machine Specialties, Inc., 1301 Washington Ave. S., Minneapolis, Minn. (Vol.81.p.629.)

"Metalmaster" contour saws are available in two sizes of throat: 14- and 30-in. A weight-actuated power feed permits cutting speeds suitable for the material bring worked. Feed force can be adjusted from 0 to 50 lb. and the angle of

force may be varied without diminishing the total force exerted. Speed change ratio of 16 to 1 is available for the saw drive, giving a saw speed range from 50 to 800 ft. per min. "Job-selector" dial provides data on saw speeds.



Bandsaw, 14-In., Metal-Cutting

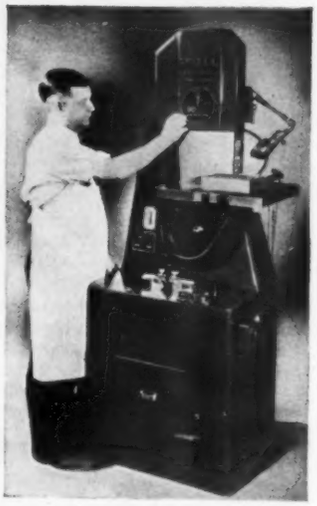
Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee, Wis. (Vol.81, p.1170.)

A 14-in. capacity, metal-cutting band-saw is offered for general shop applications. This saw will cut materials up to 6 in. thick. Five speeds are provided: four for metal, of 125, 175, 250 and 340 ft. per min. and one for wood of 2,200 ft. per min.

Contour Saw, Job Selector

Continental Machine Specialties, Inc., 1301 Washington Ave. S., Minneapolis, Minn. (Vol.81, p.263.)

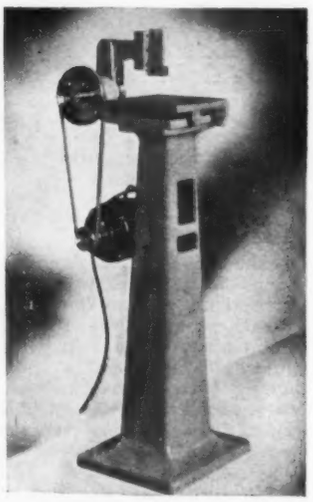
The "Job Selector Dial," a feature of the Doall contour machine, is mounted on the hinged door covering the upper wheel. It lists 48 different materials in alphabetical order around the rim of the dial, from aluminum to zinc.



Die-Filing and Lapping Machine

Brickner-Kropf Machine Co., Muskegon Heights, Mich. (Vol. 81,p.342.)

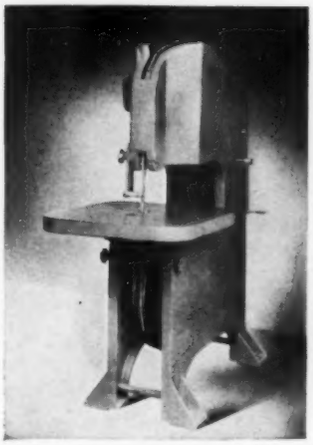
Primarily designed for machine finishing shoulder punches, this filing and lapping machine is claimed to be equally efficient wherever machine filing or lapping is required. File holder may be removed quickly from the work without disturbance of any adjustment. Specifications: table, 8¾x9 in.; distance between table and head, 3 in.; stroke, 0 to 1 in.; adjustment of file holder, 3½ in.; height of table above floor, 37 in.; standard speed, 700 r.p.m.; net weight, 160 lb.



Filing Machine, Type D-3

Grob Bros., Grafton, Wis. (Vol. 81,p.221.)

Type D-3 continuous filing machine is a heavy-duty floor-type machine having a throat depth of 24 in. The file chain, on which the files are fastened, is positively driven to elimi-



nate slippage. Thickness of the files is kept to an accuracy of 0.002 in. Machine also can be arranged for chains of abrasive stones, which can be used to lap dies after they have been hardened. Three speeds are provided and the table is 30x30 in.

Saw, Swing-Frame, Higley-Type

Porter-McLeod Machine Tool Co., Inc., Hatfield, Mass. (Vol. 81,p.1292.)

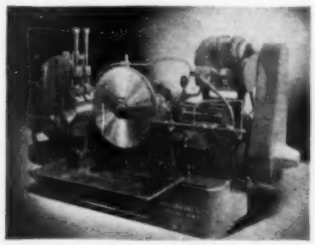
This 8-in. "Higley-Type" swing-frame, up-feed type cold metal saw is the first of a redesigned and modernized line of sawing machines being developed from the units formerly

manufactured by Higley Machine Co. Feed is upward through an elevating pinion and steel quadrant and is controlled by a flat-faced friction. Machine shown is equipped with standard clamping equipment for manual operation. Complete hydraulic clamping fixtures can be supplied.

Saw, Circular, Hydraulic

Cochrane-Bly Co., Rochester, N. Y. (Vol.81,p.263.)

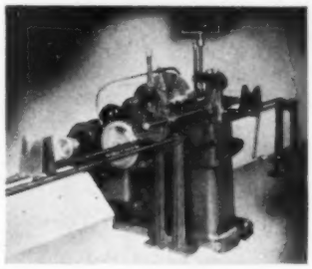
Intended for use in cutting non-ferrous tubing and bars, the high-speed hydraulic cold saw has a four-speed sliding-gear transmission. Remote control is provided for changing saw speeds from 235 to 600 ft. per min. cutting speed, and hydraulic feed is adjustable from 0 to 60 in. per min. Machine has automatic trip, rapid return of carriage and rapid forward traverse of carriage. This saw has capacity for tubes up to 8 in. diameter.



Circular Saw, No. 2-B

Cochrane-Bly Co., Rochester, N. Y. (Vol.81,p.427.)

No. 2-B metal sawing machine is equipped with multiple cutting equipment for small round bars. Vise has capacity for holding eight 1¼-in. round

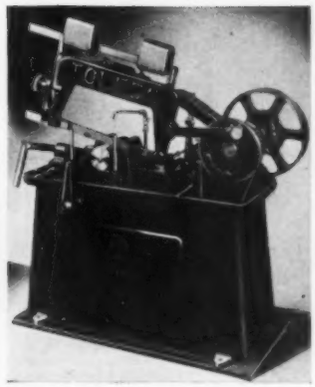


bars, or 118 ¾-in. bars at one time. Other sizes are in proportion. Lubricant pump is provided with flexible tube and distributing nozzle. Machine also can be arranged for cutting single bars.

Hacksaw, Power

L-W Chuck Co., Toledo, Ohio. (Vol.81,p.432.)

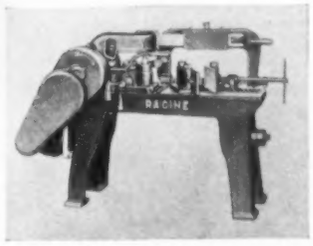
A 6x6-in. capacity high-speed power backsaw using 10- to 14-in blades and providing automatic saw relief on the non-cutting stroke. Automatic trip stops the machine at the end of the cut. Coolant pump is mounted in the base. Weight, crated, 460 lb.



Hacksaw, Power Dry-Cut

Racine Tool & Engine Co., Racine, Wis. (Vol.81,p.873.)

This power saw is of the dry-cut type and employs a simple hydraulic feed principle. Capacity of saw is 6x6 in. Vise



swivels to 45 deg. A V-belt drive from motor to drive gears is used, and two speeds are available. Feed dial gives infinite range of pressures from zero to maximum to accommodate all classes of materials.

DRILLING MACHINES

Drilling Machine, Continuous

Langelier Mfg. Co., Providence, R. I. (Vol.81,p.584.)

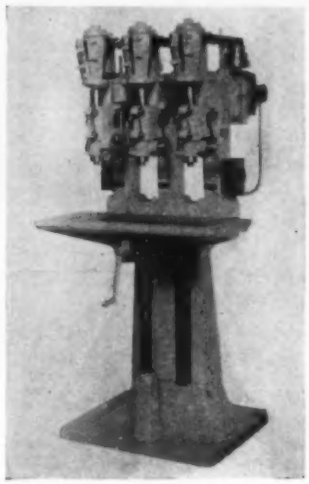
This continuous-type cap-screw drilling machine is constructed with four spindles and chucks the work in spring collets. Spindles are mounted

horizontally and the work is rotated, instead of revolving the drills. Carrier rotates about fixed cams which automatically open and close the chucks, eject the drilled screws and also stop the rotation of the collets at the loading position. Driving shaft for the chucks is equipped with a three-step cone pulley, providing speeds of 1,400, 1,800 and 2,500 r.p.m. at the collets.

Drill Presses, Sensitive

Toledo General Mfg. Co., 3620 Summit Ave., Toledo, Ohio. (Vol.81,p.1118.)

Models DAV and DBV sensitive drill presses have separate vertical-motor drive for each spindle. The Model DAV units have ⅝-in. capacity, while the Model DBV machines have ¾-in. capacity. Standard ball-bearing motors are mounted on a hinged bracket and have a four-step cone drive pulley mounted on the motor shaft.

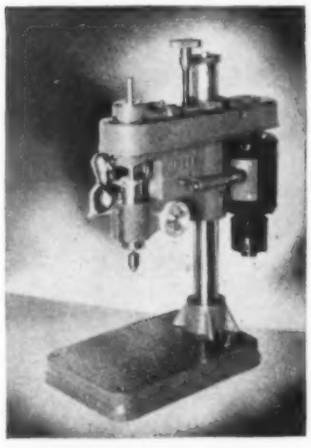


Drill Press, Sensitive

Taylor Mfg. Corp., 2330 W. Clybourn St., Milwaukee, Wis. (Vol.81,p.260.)

Designed for producing very small holes, the "Hi-Eff" sensitive bench-type drill press is smooth running with spring-cushioned motor drive. Lightweight spindle is designed to allow the operator to feel a 0.002 in. diameter drill cut away the material.

Six models are available with capacities for drills from 0.002 in. to ¼ in. diameter. Four of the six models have a speed range from 800 to 10,000 r.p.m.



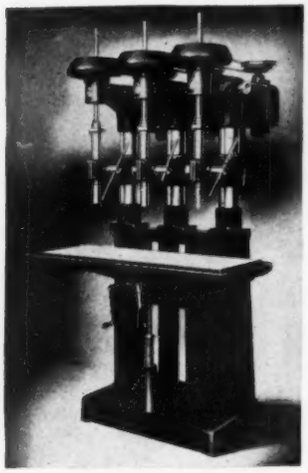
Drill Press, Sensitive No. 16

Buffalo Forge Co., 448 Broadway, Buffalo, N. Y. (Vol.81, p.219.)

Available with one to six spindles and in three styles, these No. 16 sensitive drilling machines have increased rigidity and increased resistance to vibration because of redesign of the cast parts. Machines are available in round-column floor

type, bench type and pedestal type.

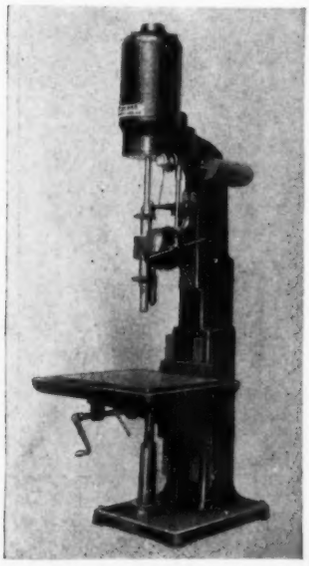
Speeds range from 400 r.p.m., suitable for $\frac{7}{8}$ in. drills in cast iron, up to 3,000 r.p.m., suitable for $\frac{1}{8}$ in., or smaller drills.



Drill Presses, Sensitive

Edlund Machinery Co., Inc., Cortland, N. Y. (Vol.81,p.1232.)

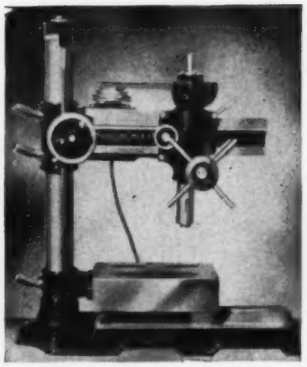
Available with 8, 12 and 15 in. overhang and with from one to eight spindles, this line of drilling machines has individual motors mounted vertically on the spindles. They may be equipped with ball-bearing back gears, semi-automatic power feeds, reversing motor and controls for tapping, and coolant pump, tank and piping. When the machine is to be used for drilling only, speeds may be 600, 900, 1,200 and 1,800 r.p.m., or 600, 1,200, 1,800 and 3,600 r.p.m.



Drilling Machine, Radial, Bench Type

Munding Mfg. Co., 703 E. Colorado Blvd., Glendale, Calif. (Vol.81,p.423.)

This 40-in. bench-type radial drill has capacity for drilling

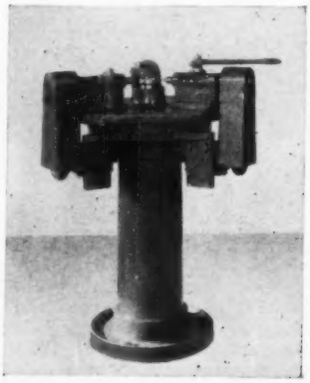


holes up to $\frac{1}{2}$ in. Standard spindle speeds are 750, 1,500, 2,500 and 3,000 r.p.m. Specifications: working space on base 10x25 in.; spindle travel, $6\frac{1}{4}$ in.; vertical travel of arm on column, 17 in.; horizontal travel of head on arm, 14 in.; net weight, 335 lb.

Drilling Machine, Special, Three-Way

Langelier Mfg. Co., Providence, R. I. (Vol.81,p.1008.)

Designed for drilling holes 120 deg. apart, this three-way, floor-type drilling machine is assembled with three horizontal, hand-fed drilling units.

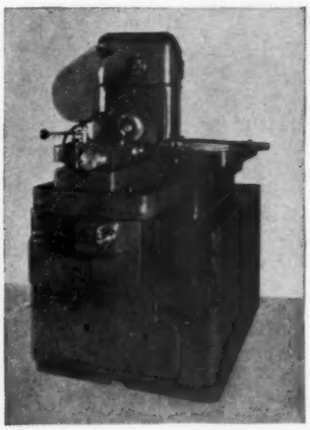


Heads are interconnected so that they will feed simultaneously. Suitable fixtures can be mounted on the machine table. Machine can be arranged for tapping by using reversing chucks.

Drilling and Tapping Machine

Langelier Mfg. Co., Providence, R. I. (Vol.81,p.382.)

A machine for drilling and tapping door knob spindles was constructed with two standard No. 21 automatic drilling units mounted on a vertical column, with individual motor drives. The right-hand unit was equipped with a 7-spindle attachable multiple drill-head and the left-hand unit with a 7-spindle attachable multiple tapping head. Work is loaded into a vertical magazine and fed progressively through the stations.



diametral pitch. Principle employed in removing metal by the enveloping process differs from conventional gear-cutting methods in that: (1) the tool and work are rotated together without control of any indexing mechanism, (2) cutting is accomplished by setting axes of tool and work askew to each other and by bringing the tool into intimate contact with the work under pressure, (3) the tool is rotated at high speed and traversed at slow speed.

Hobbing Machine, Bench-Type

Barber Colman Co., River & Loomis St., Rockford, Ill. (Vol. 81,p.1288.)

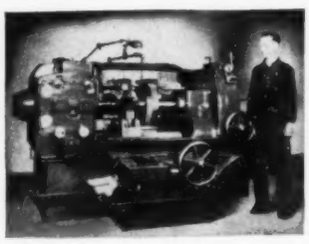
Designed for high-speed, continuous hobbing of spur gears and pinions for small, precision apparatus, the Type S bench-type hobbing machine will handle work up to 1 in. diameter by $\frac{1}{2}$ in. face of any machinable material. Cycle is fully automatic and includes work-loading, rapid approach to hob, feed, quick return, ejection of work and repeat. Operator only has to keep the machine loaded. Machine also can be hand-loaded and operated as a single-cycle machine.

GEAR CUTTING AND FINISHING MACHINES

Gear Generator, Farrel-Sykes No. 2-C

Farrel-Birmingham Co., 344 Vulcan St., Buffalo, N. Y. (Vol. 81,p.257.)

Model No. 2-C Farrel-Sykes gear generating machine has capacity for gears ranging from $\frac{1}{4}$ to 25 in. in diameter and up to 8-in. face width. It will cut gears having a maximum pitch of 3 D.P. helical and $2\frac{1}{4}$ D.P. straight teeth, and a minimum pitch of 24 D.P. Machine operates on the gear shaper principle, using circular gear-form cutters. Weight is 13,900 lb. and floor space occupied is 111x87 in.



Gear Generator, No. 8 Enveloping,

Fellows Gear Shaper Co., Springfield, Vt. (Vol.81,p.998.)

Designed for finishing gear teeth that previously have been roughed in another machine, the No. 8 enveloping gear generator has capacity to finish gears up to 8-in. pitch diameter, $2\frac{1}{2}$-in. face width and 4

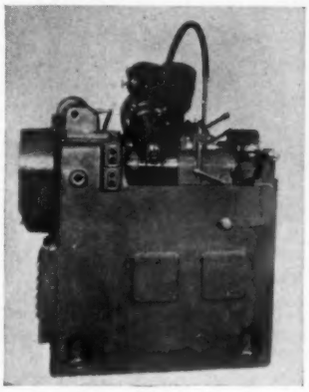
Thread Generator, Hourglass, Type 6T

Fellows Gear Shaper Co., Springfield, Vt. (Vol.81,p.1282.)

Arranged with automatic electric control to facilitate operation, the No. 6T hourglass thread generator makes possible the production of accurate and smoothly-finished worm threads at a high production rate.

Work is held between cones and cutter is kept in step with the threads on the work through feed gears and is fed down directly into the work. Rate of feed per revolution is governed by the rise on the feed cam in conjunction with feed gears.

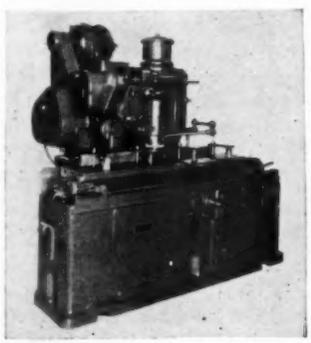
Specifications: maximum pitch, $\frac{3}{4}$ diametral; maximum helix angle, 15 deg.; maximum pressure angle $14\frac{1}{2}$ deg.; maximum work and cutter center distance, $3\frac{3}{4}$ in.; minimum work and cutter center distance, $1\frac{3}{8}$ in.; maximum outside diameter of cutter, $5\frac{1}{2}$ in. Net weight, 5,000 lb.



Rack Shapers, Automatic

Fellows Gear Shaper Co., Springfield, Vt. (Vol.81,p. 1225.)

Designed for high-production cutting of spur and helical tooth racks, the No. 3-48 and No. 3-60 rack shapers are identical with the exception of capacity for length of cut. Position of the bed, when the cutter is in action on the work, is controlled by a feed cam which, in conjunction with



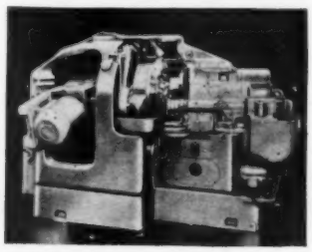
change gears, controls depth of cut and feed per stroke. Saddle carrying the cutter-spindle is of the "relieving" type and is actuated by a positive mechanism.

Specifications: maximum length of rack, 48 or 60 in.; maximum face width of rack piece, 3 in.; maximum pitch, spur, $\frac{1}{4}$ diametral; maximum pitch, helical, 5 diametral; maximum helical angle, standard guides, 30 deg.; approximate pitch diameter of cutter, 5 in.

Gear Finisher, Spiral-Bevel and Hypoid

Gleason Works, 1000 University Ave., Rochester, N. Y. (Vol.81, p.861.)

Gears previously rough cut in the standard Gleason gear rougher can be transferred to the No. 22 single-cycle spiral-bevel and hypoid "Formate" gear finishing machine to be finished. Cutter and gear remain in normal full-depth operating position during the entire cycle. Cutter rotates at a



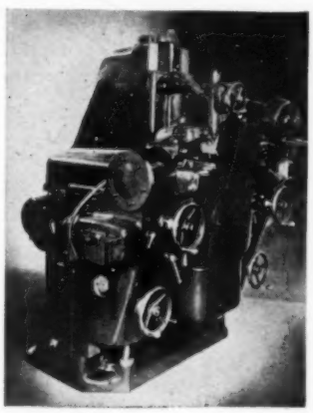
uniform speed, and when the cutter revolutions equal the number of teeth in the gear, the gear is finished.

Automatic features have been protected by safety devices. The machine will finish cut spiral-bevel and hypoid gears as large as 18 in. pitch diameter, $2\frac{1}{2}$ diametrical pitch, $2\frac{1}{2}$ in. face and 9 in. cone distance, having a ratio of 12 to 1. Largest pitch angle is 85 deg. 14 min. while the smallest is 71 deg. 34 min.

Gear Finisher, Two-Cutter

Michigan Tool Co., 7171 E. McNochols Rd., Detroit, Mich. (Vo!.81,p.24.)

In this two cutter, crossed-axis, rotary gear finishing machine gears are mounted between centers and are passed between two crossed-axis cutters toward the rear of the machine during the working stroke. The two cutters can be used independently to finish simultaneously two gears of different characteristics in a cluster or both right- and left-hand sides of a herringbone gear. This is made possible by making the two cutters separately adjustable.



Gear-Lapping Machine, Crossed-Axes

Michigan Tool Co., 7171 E. McNochols Rd., Detroit, Mich. (Vol.81,p.670.)

Designed to lap gears ranging from $1\frac{1}{2}$ to 20 in. in diameter and clusters up to 30 in. long, the universal crossed-axes gear-lapping machine is of a duplex type with two laps. These laps may be used either for lapping front and back sides of gear teeth at the same time, with the machine running in one direction only, or may be set to lap two separate gears, as on a cluster, simultaneously. Automatic cycle control mechanism that is adjustable to permit lapping cycles ranging from 5 sec. to 20 min. in both directions is provided.

Gear Burnisher, "Bolender"

Cimatool Co., Dayton, Ohio. (Vol.81,p.872.)

The Bolender burnishing machine for truing the surfaces of gear teeth has been improved by increasing the size of the

slide which carries two idle burnishers. It has been fitted with a screw adjustment for rapid positioning. Dial pressure gage shows pressure between burnisher and work gear. Machine has capacity for gears $1\frac{1}{8}$ to 20 in. in diameter.

Gear Burnisher, Fine-Pitch, No. 4B

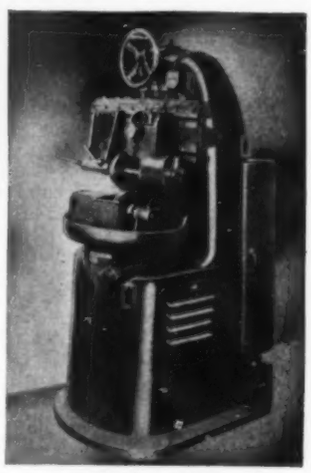
Fellows Gear Shaper Co., Springfield, Vt. (Vol.81,p.900.) *troit, Mich.* (Vol.81,p.585.)

This machine is e ectrically controlled in such a way that it is claimed to be impossible to bruise the teeth of fine-pitch gears. Four idler and one driven burnishing gears make it possible to burnish two gears at a setting. Time of burnishing is automatically controlled by adjustable timing relays having a range of from 3 to 40 sec. It is claimed to be possible to burnish gears at a rapid rate; a 4-in. diameter, $\frac{1}{16}$-in. face gear can be handled at the rate of 480 per hr.

Gear-Lapping Machine, Type GLF

National Broach & Machine Co., Shoemaker & St. Jean Sts., Detroit, Mich. (Vol.81,p.585.)

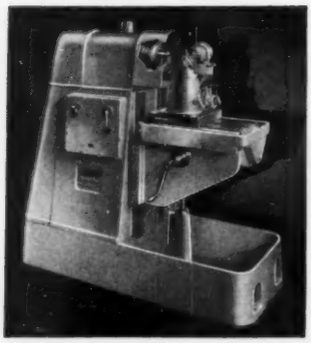
Type GLF gear lapping machine is designed for the correction of helix angle, eccentricity, involute curvature and tooth spacing in gears. "Crossed-axes" principles of lapping, in which the lap gear drives the work gear, is used. Machine will accommodate gears up to 8-in. diameter. Maximum lap face is $3\frac{1}{4}$ in. Angle between work gear spindle and lap spindle is readily adjustable, as the lap is mounted on the machine tab'e which has a 15 deg. swing and a Vernier adjustment for close setting.



Gear Finisher, Tooth Rounder

Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich. (Vol.81,p.258.)

This No. 35 gear tooth rounder has been improved by the use of a new hydraulic-control system in which valves are electrically controlled. This

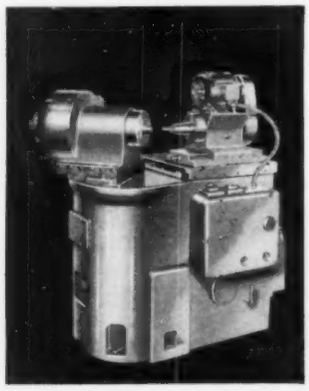


machine has capacity for gears up to 34-in. diameter by 15-in. face. Speeds and feeds are easily controlled by the operator and up to 140 teeth can be cut per min. Machine occupies 32x60 in. floor space, weighs approximately 3,200 lb. and is driven by a 3 hp. motor.

Gear Finisher, Tooth Pointer

Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich. (Vol.81,p.258.)

Model 40 single-spindle gear-tooth pointing machine is controlled by electric pushbutton and pedal, leaving both of the operator's hands free for loading purposes. This unit has

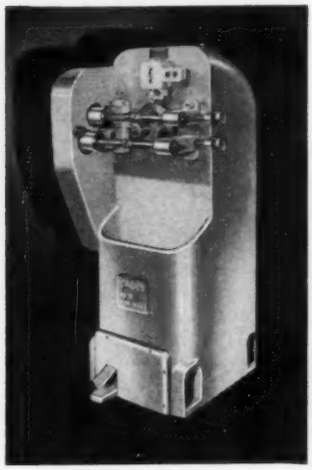


capacity for gears up to 20-in. diameter and 10-in. face, and will cut 2 pitch or finer. Gears with from 8 to 150 teeth can be indexed with the standard range; other ranges are available. Up to 150 teeth can be pointed per minute. Net weight is approximately 3,200 lb. and the machine occupies a floor space of 65x45 in.

Gear Finisher, Tooth Burring

Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich. (Vol.81,p.258.)

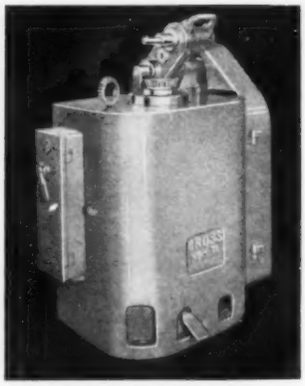
No. 70 gear tooth burring machine functions on the "continuous cutting" principle and there is no time lost in indexing because the work and cutters rotate in timed relation at a constant speed. An automatic stop shuts the machine down upon completion of one full cutting cycle. This machine will remove burrs and sharp edges from external spur and helical gear teeth, straight and spiral bevel gear and pinion teeth, and external straight and helical splines.



Gear Finisher, Tooth Burring

Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich. (Vol.81,p.258.)

Designed for internal operations, the No. 71 gear tooth burring machine has a vertical spindle. Cutter-head is counterbalanced to stay in the "up" position when not held down by the operator. Machine starts automatically when the cutter head is moved downward and stops when the cutter head is returned to the "up" position. This machine functions on the continuous cutting principle.



Gear Chamfering Machines

Cimatool Co., 1517-1531 E. Third St., Dayton, Ohio (Vol. 81,p.221.)

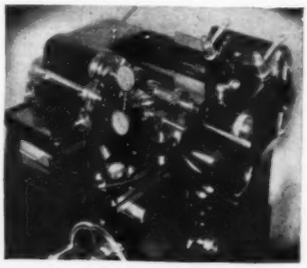
High-speed gear chamfering machine is available in three different models, each of which can be arranged for either air, hydraulic or manual operation. Production speeds on chamfering and burring range as high as 600 teeth per minute. These machines utilize hollow mill cutters.

The smallest model, No. 4-A, consists of a single work head and a single cutter spindle mounted on a common base. No. 4-B model has a single work head with two cutter spindles, both designed to simultaneously machine a single part. The No. 4-C model, combining two of the single spindle machines, enables one operator to load one part on one work head while the other half of the machine is operating on another part.

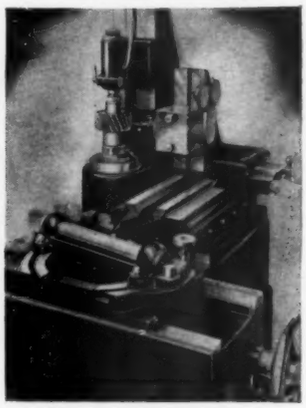
Gear Checker, Spiral Lead

Michigan Tool Co., 7171 E. McNochols Rd., Detroit, Mich. (Vol.81,p.261.)

A sine bar is used in the spiral lead checker and is set



to correspond to the correct spiral lead by means of two measuring buttons. This checker will take gears up to 16 in. diameter with leads of 6 in. or more for either right- or left-hand spirals. Indicator movement and gear rotation are synchronized during checking.



Gear Tooth Checker, Involute and Spacing

Michigan Tool Co., 7171 E. McNochols Rd., Detroit, Mich. (Vol.81,p.261.)

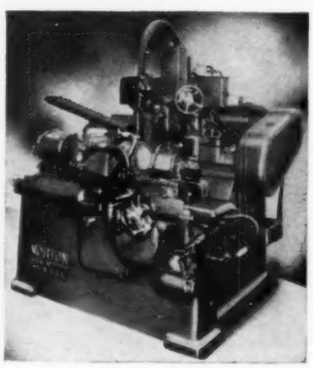
This combined involute and tooth spacing checker requires no master forms or master base circle disks. Sine bar acts as a compensator for differences between the lengths of arc on the friction disk, which originates the machine movements on the base circle of the gear being checked. Angular setting of the sine bar controls the movement of the indicator head. Gears up to 12 in. diameter by 12 in. long can be checked on front and back faces in the same set-up.

GRINDING AND HONING MACHINES

Grinder, Automatic, Cylindrical

Norton Co., Worcester, Mass. (Vol.81,p.589.)

A wholly automatic arrangement of the 10-in. Type C cylindrical grinder has been made for plunge-cut grinding operations. This machine grinds



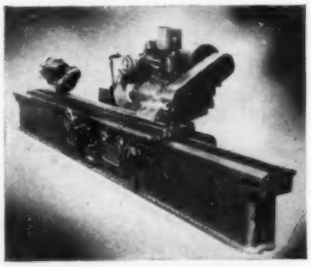
cylindrical parts concentric with their axes, in large quantities, with a minimum amount of attention required from the operator. Nominal capacity of the machine is 10 in. diameter by 18 in. long. A grinding wheel 24 in. diameter and up to 5 in. wide or 20 in. diameter up to 7 in. wide can be used. Wheel is driven by a constant-speed 10 to 25 hp. motor.

Grinders, Cylindrical, Hydraulic, Type BD

Landis Tool Co., Waynesboro, Pa. (Vol.81,p.582.)

The 10-in. and 14-in. Type BD plain hydraulic grinders are designed for grinding relatively long work having small diameters. When necessary, table may be gapped to swing work having projections. These machines supersede Type B plain grinders. Table traverse

speed range is 12 to 240 in. per min. These machines are available in four sizes: 10x96 in., 10x120 in., 14x96 in., and 14x120 in. Net weight of 10x96 in. machine is 17,800 lb.



Grinder, Cylindrical, Plunge-Cut

Fitchburg Grinding Machine Corp., 76 Winter St., Fitchburg, Mass. (Vol.81,p.806.)

Designed to do plunge-cut grinding only, this 6x12-in. cylindrical grinder incorporates the "Bow-gage" wheel head unit. No table traverse is provided, but the wheel spindle has a reciprocating motion. Specifications: maximum swing over table, 14 in.; maximum length between centers, 12 in.; number of work speeds, infinite from 50 to 350 r.p.m.; maximum feed of "Bowgage" wheelhead on diameter, 0.125 in.

Grinder, Cylindrical Plain, No. 5

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p.711.)

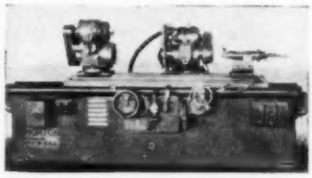
Available in 3x12-in. and 3x18-in. sizes, the No. 5 plain cylindrical grinding machines have been developed for rapid grinding duplicate small parts to close limits on a production basis. The 3x12-in. machine is recommended for installations where the work is not over 12 in. long and minimum floor space is an important factor. All operating controls and adjustments are grouped at the front of the machine. Maximum diameter of work that can be swung on centers, $3\frac{3}{32}$ in. Swivel table can be set to taper of $3\frac{3}{4}$ in. per ft. on the 12-in. machine. Four work speeds of 202, 319, 505 and 800 r.p.m. are available. Wheel spindle speed is 1,776 r.p.m. An additional spindle speed of 2,045 r.p.m. is provided to give correct surface speed as the wheel wears. Power table traverse speeds of 6, 11, 22, 30, 70 and 133 in. per min. are provided.

Grinder, Universal, "Multipurpose"

Norton Co., Worcester, Mass. (Vol.81,p.802.)

A completely redesigned model of the "Multipurpose" universal grinder is offered with a 14-in. swing and in 36-, 48- and 72-in. lengths. Hydraulic power work-table traverse is provided. Swivel adjustment at the right end of the table comprises a screw and nut arrangement, providing for close adjustment.

Universal headstock is mounted on a swivel base and may be turned through the entire 360 deg. and clamped in any desired position. Universal grinding wheelhead rests on



a swivel base and compound slide. Wheels for either external or internal grinding may be set at any angle with the work. Feed may be in the normal direction, perpendicular to the table ways, or in any angular direction for which the wheel head is set.

The 48-in. machine shown weighs about 8,000 lb., mounts wheels up to 14x1½ in. for cylindrical grinding or cup-type wheels 12x3 in. for face grinding. This machine will swing work $14\frac{15}{16}$ in. over the table top. A 5-hp. motor is required for the wheel drive and a ½-hp. motor for the work drive.

Grinder, Universal, Cutter and Reamer

Union Twist Drill Co., Athol, Mass. (Vol.81,p.1232.)

Cutters up to 12-in. diameter or reamers up to 24-in. long can be ground on the No. 1 universal cutter and reamer grinder. A cup-form wheel is used to give a flat clearance and a strong cutting edge.

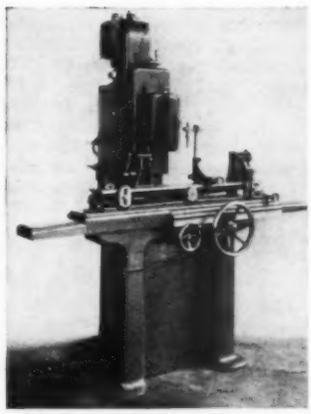
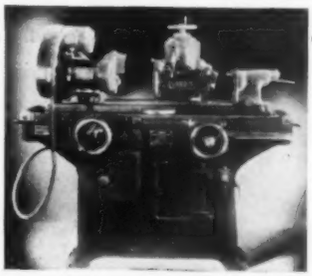


Table is mounted on roller bearings and is reciprocated by rack, pinion and hand wheel.



Grinder, Universal and Tool, 12x28-In.

Landis Tool Co., Waynesboro, Pa. (Vol.81,p.338.)

With standard equipment, the 12x28-in. universal and tool grinder is suitable for many surface grinding and internal grinding operations in addition to the usual external cylindrical operations. The wheelhead may be swiveled 90 deg. in either direction.

Specifications: maximum distance between centers with universal headstock, 28 in.; maximum diameter machine will grind with full size wheel, 12 in.; maximum traverse of work table, 30 in.; length of grinding at one setting, 28 in.; work table traverse per minute, 12 to 60 in.; swivel table graduated to grind included angle of 20 deg. Grinding wheel spindle speeds of 2,385, 3,180 and 4,000 r.p.m. are provided.

Grinder, Roll, Special, "Type 30"

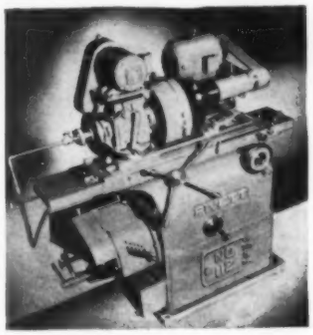
Landis Tool Co., Waynesboro, Pa. (Vol.81,p.1174.)

A specially arranged grinder has been developed for rough and finish grinding special-alloy chilled-iron rolls. For this purpose a 36 in. by 18 ft. standard Type 30 roll grinder was arranged with an extra long rear-bed section. This section mounts two grinding wheel carriages. A conventional Type 30 wheel carriage serves for the finishing operation. Two 36x6x18-in. wheels are mounted against each other in the center of a massive wheel spindle in the roughing carriage. These wheels are carried between bearings. Machine weighs 195,000 lb. Wheels can be changed on the roughing carriage or the finishing carriage, while the other carriage is in use.

Grinder, Internal, No. 112

Rivett Lathe & Grinder, Inc., 20 Riverview Rd., Brighton, Boston, Mass. (Vol.81,p.671.)

Designed for straight, bevel, two angle, or straight and bevel grinding at one setting, the No. 112 precision internal grinder can be fitted with a low-speed spindle carrying a wheel up to 6-in. diameter by ½-in. face for external work.

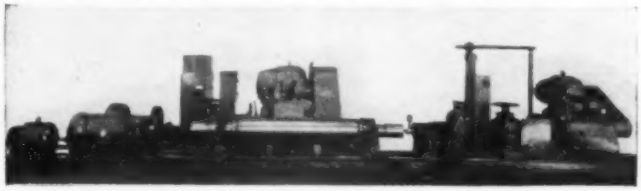


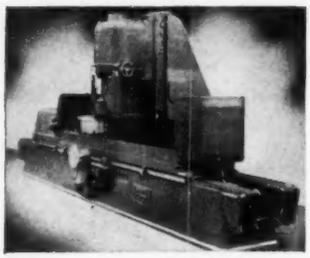
Specifications: grinding capacity, hole diameter, ½ to 8 in.; automatic table travel, ½ to 8 in.; hand table travel, 16 in.; swing over table, 14 in.; cross-feed fial graduated to 0.0005 in.; collet capacity, 1 in.; height workhead spindle to floor, 50 in.; floor space, 55x40 in.; net weight with motors, 3,635 lb. Grinding spindle speeds are 10,000 r.p.m. for high-speed spindle, and 4,600 r.p.m.

Grinder, Surface, Vertical Spindle

Hanchett Mfg. Co., Big Rapids, Mich. (Vol.81,p.218.)

The No. 400 series vertical spindle surface grinders are built in lengths from 50 to 132 in. A 22-in. diameter by 4 in. high by 2 in. face wheel of either cylindrical or segmental type is used. Motor is of the built-in type of either 30 or 40 hp., as required. The T-slotted table top is 18 in.



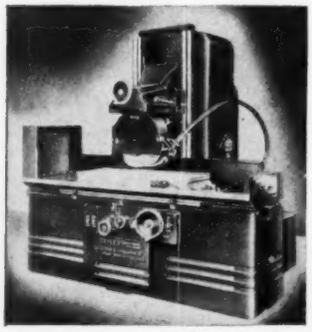


wide and it is hydraulically operated by means of pressure pump, cylinders and pistons. Table speeds range up to 90 ft. per min.

Grinder, Surface, Hydraulic-Feed

Gallmeyer & Livingston Co., 346 Straight Ave., S.W., Grand Rapids, Mich. (Vol.81.p.629.)

All operating controls of the Style F high-speed cross-traveling head type hydraulic feed

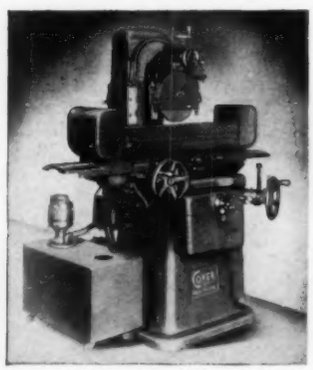


surface grinders are in the center of the base and easily accessible. Table speed has an infinite variation from 0 to 150 ft. per min. Cross traveling movement normally operates at each reversal of the table and amount of movement can be set between $\frac{1}{32}$ to 2 in. Automatic reverse is provided for cross travel of the wheel.

Grinder, Surface, No. 5

Covel Mfg. Co., Benton Harbor, Mich. (Vol.81,p.302.)

No. 5 hydraulic-feed surface grinder is designed for precision production grinding. Table speed is variable from 10 to 90 ft. per min. This makes practicable the use of harder and more open grinding wheels.

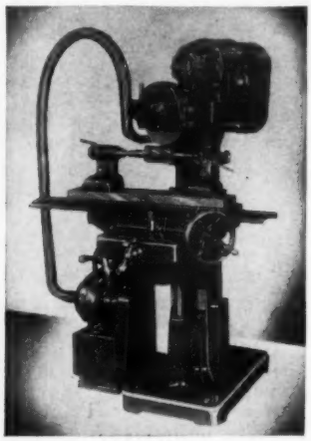


Accurate cross-feed facilitates grinding up to a shoulder. Specifications: capacity to grind work 24 in. long, 8 in. wide, and 11 in. high under a 12 in. wheel; table working surface, 6x24 in.; table longitudinal movement, 26 in.; table traverse, 8½ in.; automatic table traverse, 0 to 0.175 in. per reversal of table; grinding wheel, 12x¾x2½ in.

Grinder, Surface and Tool

Covel Mfg. Co., Benton Harbor, Mich. (Vol.81.p.628.)

Equipped with both a swivel head and a swivel table, the No. 72-A swivel-head surface grinder is suitable for grinding all types of milling cutters, counterbores, special tools and irregular surfaces. Specifica-



tions: longitudinal travel of table, 18 in.; vertical travel of table, 11 in.; traverse movement of table, 7½ in.; working surface of table, 6x28¾ in. Head swivels 30 deg. either way. Table swivels 45 deg. each way and centers will swing work 12½ in. diam. by 14½ in. long. Maximum distance from center of grinding wheel to the table is 17½ in., minimum distance is 6½ in. Main spindle speeds are 1,900, 2,400 and 2,900 r.p.m.

Grinder, Spline

Fitchburg Grinding Machine Corp., Fitchburg, Mass. (Vol. 81,p.142.)

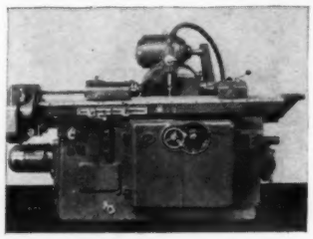
This spline-shaft grinder will take 60-in. between centers when equipped with the table-type truing device and 72-in. between centers when the tru-

ing device is mounted on the wheel head. The table-type "W"-form truing device is adjustable for diamond height so that the "W" form of the wheel will coincide with the finished size of the splines after grinding. This device is suitable for production work and is a fast operating mechanism. There are three diamonds, which operate on eccentric rods.

Grinder, Thread, Automatic, 48-In.

Jones & Lamson Machine Co., Springfield, Vt. (Vol.81,p.801.)

Designed to grind threads in hard or soft material on work up to 8 in. in diameter when using a 20-in. grinding wheel, this automatic thread grinder will hold work 48 in. long be-

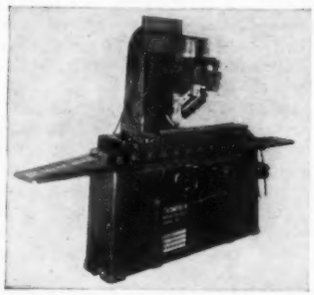


tween centers and 18 in. of thread may be ground anywhere on 36-in. work length. Work 11½ in. in diameter may be swung over the work slide and 11½-in. diameter threads may be ground when the wheel is 16½ in. in diameter or smaller. Helix-angle capacity includes 25 deg. right-hand and 30 deg. left-hand.

Grinders, Broach

Thompson Grinder Co., 1534 W. Main St., Springfield, Ohio. (Vol.81,p.1050.)

Available in 6x48, 6x60 and 6x72-in. sizes, these surface-broach grinders have wheel heads that swivel 45 deg. each way and wheel-head motors that swivel from 0 to 90 deg. These machines are designed for manufacturing and sharpening flat or surface broaches and have a locating finger for po-

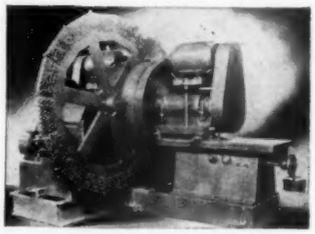


sitioning the broach tooth relative to the grinding wheel. The manually operated machine, Type T-47, locates broach teeth either to a predetermined spacing or from established teeth. The semi-automatic machine, Type T-20, has a hydraulically operated table feed and is arranged for automatic tooth location. Table operation is in timed relation with the wheel-head stroke and can be operated at a variable speed.

Grinder, Double-Head, Disk, No. 140-40 in.

Gardner Machine Co., 410 E. Gardner St., Beloit, Wis. (Vol.81,p.224.)

This 40-in. double-head grinder was built to meet high-production requirements of a manufacturer of automobile valve springs. Each head has an adjustment for angularity,



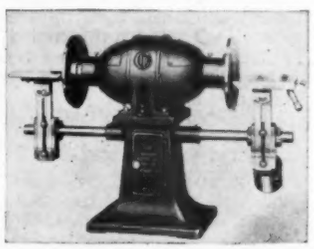
to permit tilting so as to open the abrasive members slightly at the top, allowing an increase in the amount of stock removed as the work passes between the wheels.

The rotary carrier measures approximately 85 in. diameter and is used to present the valve springs to the grinding members. In the ferris-wheel member are mounted sixteen steel blocks, each with steel bushings for holding the springs.

Grinders, Disk, Double-End

Cincinnati Electrical Tool Co., Madison and Edwards Roads, Cincinnati, Ohio. (Vol.81,p. 812.)

Several sizes of disk grinders, available in the double-end disk type shown, or with a disk on one side and a con-



ventional grinding wheel and wheel guard on the other side, have disks of steel, balanced to insure true running. A table with hand lever feed is supplied on the right-hand side of the machine and a plain table is mounted on the opposite side.

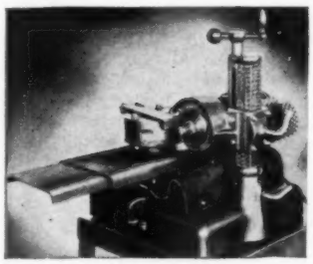
Grinders, Chaser, Motorized

Landis Machine Co., Waynesboro, Pa. (Vol.81,p.1117.)

Designed to replace Model "Y" and No. 2 chaser grinders, these three grinders are of sufficient capacity to cover the entire range of sizes of Landis chasers for dieheads and threading machines. Grinding wheels are mounted directly

on the armature shaft of the motor of these grinders, eliminating gear or chain drives.

Smallest machine of the line is the Model "O", which is designed primarily for the grinding of chasers for the smaller sizes of dieheads. No. 1 grinder is a heavier machine which may be used for grinding chasers up to 1⅞ in. wide. The largest chasers can be ground under the most severe production conditions in the No. 1½ grinder, which is the largest of the series.



Grinder, Chaser

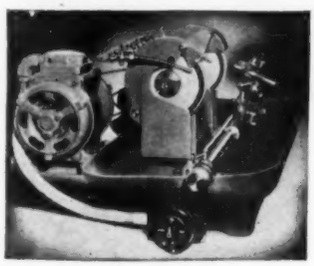
Oster Mfg. Co., 257 E. 61st Pl., Cleveland, Ohio. (Vol.81,p.219.)

This grinder for threading dies and chasers of all types is compact and is powered by a universal motor. It is equipped with a special fixture and wheel for each type of chaser. Micrometer adjustments make it possible to obtain a good grind on the cutting edge and the leads.

Grinder, Tool, "Agathon"

Russell, Holbrook & Henderson, Inc., 99 Hudson St., New York, N. Y. (Vol.81,p.628.)

"Agathon" grinding and lapping machines are designed particularly for cemented-carbide tools. Diamond wheels are furnished in two grades, one for rough and the other for finish grinding or lapping. Each has a rim width of 0.40 in. on a 6-in. diameter and a

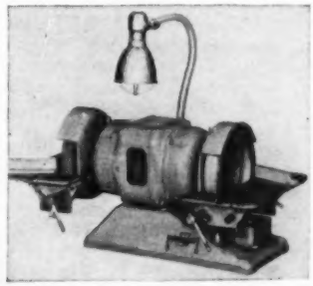


diamond depth on each side of 0.160 in. for the roughing and 0.080-in. for the finishing wheel. Standard tool-rest supplied with the machine will take a tool shank up to ½ in. square. A large tool-rest, having capacity up to 1⅛ in. square, can be furnished.

Grinder, Carbide Tool

Baldor Electric Co., 4357 Duncan Ave., St. Louis, Mo. (Vol.81,p.1118.)

Powered with a ½-hp. reversible motor, so that either right-hand or left-hand tools may be sharpened with the wheel



always rotating toward the cutting edge, this carbide tool grinder is equipped with two wheels. One wheel is used for roughing operations and the other for finishing. Motor operates at 3,400 r.p.m. and is of the ball-bearing type.

Grinder, Tool

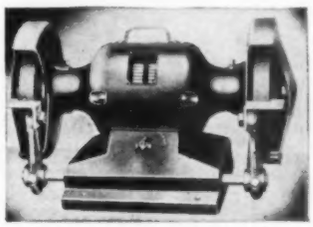
Sundstrand Machine Tool Co., 2531 Eleventh St., Rockford, Ill. (Vol.81,p.862.)

A 2-wheel type replaces the 3-wheel tool grinder and is designed to simplify the grinding of modern tools, including high-speed steel and cemented-carbide types. Machine uses a cup-shaped grain wheel for rough grinding. A diamond-faced wheel is provided at the opposite end of the machine for finishing tools. Specifications: dimensions of base, 25x26½ in.; adjustment of work table, 10 deg. above horizontal, 30 deg. below horizontal; in-feed of grinding table, 2¾ in.; weight, 1,090 lb.; height of spindle above floor, 40¼ in.

Grinder, Bench, ½ Hp.

Diehl Mfg. Co., Elizabethport, N. J. (Vol.81,p.593.)

Machine has a substantial cast-iron base arranged for fastening the grinder to bench or table. Adjustable steel tool

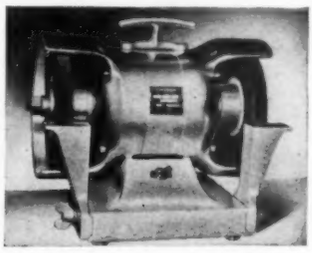


rests may be set to compensate for wheel wear. Specifications: height, 10⅞ in.; 19¼ in.; width, 11½ in. Net weight, 65 lb. Standard ½-hp. units are designed for 110 volts, 60-cycle, single-phase a.c. operation.

Grinder, Bench, 6-in.

Black & Decker Mfg. Co., Towson, Md. (Vol.81,p.422.)

The 6-in. "Junior" portable bench grinder is equipped with ball-bearings, which are protected against dust and dirt

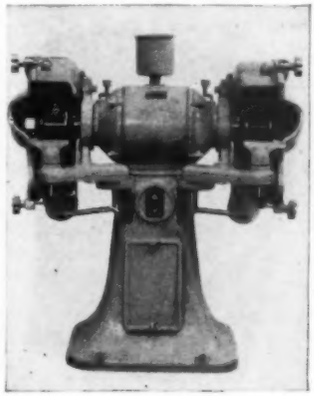


by special sleeves. Unit is powered by a standard ¼-hp. constant-speed motor. Specifications: over-all spindle length, 12½ in.; total height, 10 in.; height to center line of spindle, 5½ in.; net weight, 31⅓ lb.

Grinder, Floorstand

James Clark Jr. Electric Co., 600-640 E. Bergman St., Louisville, Ky. (Vol.81,p.1112.)

Designed for heavy production grinding, the 5-hp. narrow-base grinder is powered

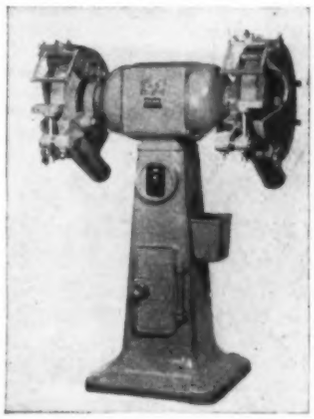


with a totally-inclosed motor. Motor frame is small in diameter permitting maximum wheel wear and maximum clearance for work. Specifications: height over-all, 46 in.; height to center of spindle, 35 in.; distance between wheel centers, 31 in.; size of wheel, 18x3x1¾ in.; floor space required, 24x44 in.; weight, 725 lb.

Grinder, Floorstand

James Clark, Jr. Electric Co., 600-640 E. Bergman St., Louisville, Ky. (Vol.81,p.1002.)

Suitable for use on production work or for general tool grinding, the 3-hp. floorstand grinder has a totally inclosed



motor in which the rotor shaft is mounted in precision-type ball bearings. Specifications: over-all height, 48 in.; height to center of spindle, 39 in.; distance between wheel centers, 28 in.; size of wheels, 14x2x1½ in. or 14x3x1¼ in.; floor space 36x19 in.; net weight, 650 lb.

Grinders, Floorstand

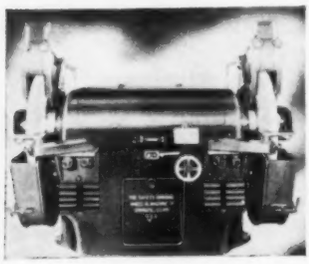
Hammond Machinery Builders, Inc., Kalamazoo, Mich. (Vol. 81,p.755.)

All grinders of 3 hp. and over have been equipped with totally inclosed fan cooled motors. Rotor and stator are placed in an inclosed chamber, sealed against entrance of foreign matter. Two fans force cooling air around the outside.

Grinder, Floorstand, "Rite Speed"

Safety Grinding Wheel & Machine Co., Springfield, Ohio. (Vol.81,p.587.)

The "Rite Speed" 30-in. heavy duty, floor stand, grinder will take wheels up to 3 in.



thick and is powered with a 20-hp. motor. This machine will maintain a peripheral speed of 9,000 to 9,500 surface ft. per min. until the wheel is worn away to 18½ in. diameter. The 24-in. machine will take wheels up to 3-in. thick and uses a 15-hp. motor.

Grinder, Floorstand Wet-Type

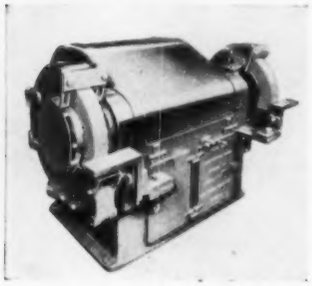
Hisey-Wolf Machine Co., Cincinnati, Ohio. (Vol.81,p.900.)

Made in three sizes, for 10-, 12- and 14-in. diameter wheels, these two-wheel wet grinders are designed for use with motors of any electrical characteristics. A constant stream of coolant is supplied directly on the work. Main drive is by V-belts.

Grinder, Heavy-Duty, Type AT

Kling Bros. Engineering Works, 1301 N. Kostner Ave., Chicago, Ill. (Vol.81,p.1162.)

A wheel-wear compensator is featured in the Type AT heavy-duty grinder. Wheel speed is increased by turning a hand-

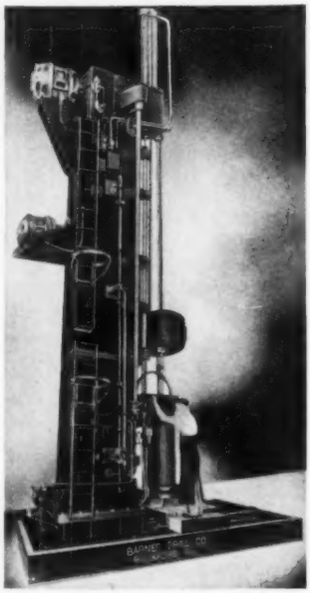


wheel, making it possible to maintain an approximate peripheral speed of 8,500 surface ft. per min. A lever mechanism between the spark guards and the compensator prevents use of new wheels at high speeds.

Honing Machines, Vertical

Barnes Drill Co., 830 Chestnut St., Rockford, Ill. (Vol.81,p. 716.)

Designed to handle hones up to 30 in. in diameter, the No. 4030 vertical honing machine has a 90-in. spindle travel. Aluminum reciprocating head, which carries the bronze driving gear together with the spindle and hydraulic piston, is



supported on an air counterbalance. Maximum capacity of the machine is cylinder up to 30 in. in diameter by 85 in. long. Maximum distance, top of table to nose of flanged spindle, is 204 in.; size of the oil-operated work table is 14x60 in. The eight quick changes of speeds, from 12 to 98 r.p.m., are controlled from levers at the operator's position. These speeds are 12, 16, 22, 30, 39, 54, 72, and 98 r.p.m. Cycles of reciprocation are variable according to the length of stroke as adjusted by the hydraulic pump control.

Honing Machine, "Microhoner," No. 1

Micromatic Hone Corp., Dubois St. at Horton Ave., Detroit, Mich. (Vol.81,p.588.)

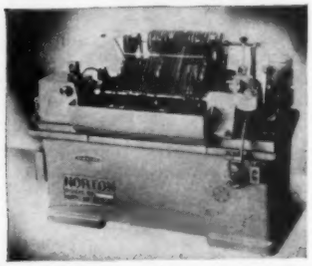
It is claimed to be possible to hone bores as small as ¼ in. diameter on a production basis with tolerances for roundness and straightness held to 0.000025 in. when using the No. 1 "Microhoner". Machine will handle a diameter range from ¼ to ⅞ in. with a maxi-

mum length of 2¾ in. for smaller diameters up to and including 7½ in. for large diameter sizes. A wobble plate is used to obtain a high speed, mechanical reciprocating motion. This, combined with rapid rotation, accomplishes the required spiraling or helical travel of the abrasive to produce a cross-hatched honed finish.

Lapping Machines, Crank and Cam

Norton Co., Worcester, Mass. (Vol.81,p.301.)

Two machines for lapping all bearing surfaces on crankshafts and camshafts are built on the same base, differences in the machines being in the application of the abrasive strip and action of the lapping arms. Lapping arms on the No. 30 "Crank-O-Lap" machine are jointed so they will follow the pins of a crankshaft as it revolves. Actual lapping of



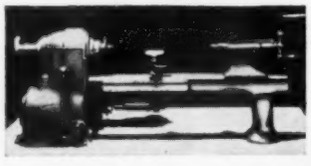
each pin and bearing is done by shoes of the correct form which hold the abrasive strip firmly in place against the surfaces to be lapped. A master cam for each cam lapping arm of the No. 30 "Cam-O-Lap" machine controls the movement of that arm, causing it to exert a uniform lapping action on each cam surface. Abrasive strips are held against the cams by shoes of the proper size. To produce the proper grade of finish the abrasive strip and supports are reciprocated rapidly in the direction of the camshaft axis while the camshaft is rotating and is reciprocated with a slower motion.

LATHES AND SCREW MACHINES

Lathe, Bench, Precision

Stark Tool Co., 218½ Moody St., Waltham, Mass. (Vol.81, p.1235.)

This integral-drive precision bench lathe is a compact unit which requires nothing but electrical connection before use. Drive consists of a ½-hp. geared-motor driving through a disk clutch and variable V-belt sheaves and V-belts to the head



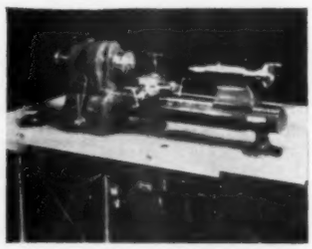
stock. Any speed between 156 and 2,200 r.p.m. can be obtained in the standard model or between 260 and 3,500 r.p.m. in the high-speed model. Both integral-drive models are built in No. 4 and No. 4½ sizes, having 9 in. swing and 40-in. length of bed. No. 4 unit has a ¾-in. maximum collet capacity through the spindle, while the No. 4½ unit has one inch collet capacity.

These lathes may be mounted on stationary or portable benches without cutting the bench or fastening the lathe in any way, making it possible to use the lathe as a portable unit if necessary. All of the standard No. 4 and No. 4½ attachments, except the milling attachment, may be used. Net weight of each unit, with regular equipment, is 310 lb.

Lathe, Bench, Transitorq Drive

Hardinge Bros., Inc., Elmira, N. Y. (Vol.81,p.1056.)

This ball-bearing bench lathe is equipped with a Transitorq



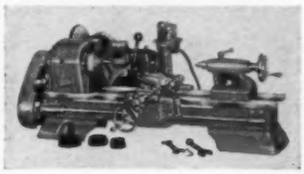
drive and a two-speed motor. The Transitorq has a range of 1 to 10 between low and high speeds and the two-speed reversible motor gives the machine spindle a double speed

range of 1 to 20, or 150 r.p.m. and all intermediate speeds to 3,000 r.p.m. These lathes are offered in five sizes, ranging from ½ to 1-in. collet capacity with 7 or 9-in. swing.

Lathe, Bench, 6-In. Precision

Atlas Press Co., Kalamazoo, Mich. (Vol.81,p.1288.)

Available with 12 or 18 in. capacity between centers, this back-geared, screw-cutting precision bench lathe will swing diameters up to 6 in. The adjustable countershaft is mount-



ed at the rear of the headstock and V-belts are used from motor to countershaft and from countershaft to headstock. Specifications: swing over bed, 6 in.; swing over carriage, 4⅛ in.; spindle speed range, 54 to 3,225 r.p.m.; thread cutting range, 8 to 96, right or left hand; hole through headstock spindle, $\frac{17}{32}$ in.; weight less motor, 90 or 98 lb.

Motor reversing switch is mounted within easy reach of the operator and belt tension is controlled by a conventional lever. There are 16 spindle speeds. Feed per revolution is 0.0026, 0.0042, 0.0052 and 0.0083 in.

Lathes, Bench, Open-Cone Type

Hardinge Bros., Inc., Elmira, N. Y. (Vol.81,p.1282.)

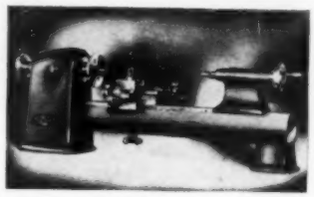
Preloaded ball-bearing spindle construction is featured in these open-cone style precision bench lathes. Greater accuracy, heavier cuts and higher spindle speeds are said to be possible with this construction. These lathes are available in five styles with capacity through collets and draw-spindle ranging from ½ in. in the Model OB-37 to 1 in. in the Model OB-59. Swing over bed is 7 in. or 9 in., depending on the model selected.

In all cases maximum difference between centers with a 32-in. bed is 13-in. This is increased to 17-in. with a 36-in. bed. All models are capable of a 3,000 r.p.m. high spindle speed and use a 1¼-in. wide belt. Headstock bearings are sealed with cork.

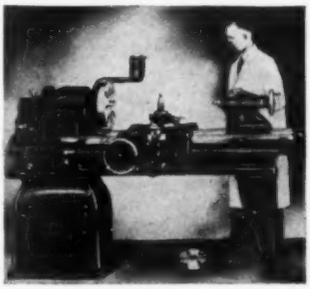
Lathe, Bench No. EH3

B. C. Ames Co., Waltham, Mass. (Vol.81,p.630.)

No. EH3 inclosed-head precision bench lathe has a ball-bearing spindle and is equipped with Transitorq drive. Spindle speeds range from 200 to 2,000 r.p.m. Specifications: length of bed, 36 in.; maximum distance between centers, 17½ in.; swing over bed, 8⅜ in. diameter; collet capacity, 1 in.; tailstock spindle travel, 3½ in.; compound rest top-slide travel, 5½ in.; compound rest bottom-slide travel, 3¾ in.; compound rest swivels 50 deg. either side of center. Net weight, 120 lb.



Twin V-belts connect the lathe and Transitorq and are adjusted by lowering the drive unit. The entire headstock unit can be taken apart easily and is equipped with preloaded precision ball bearings. The bed is cored to reduce weight and has a T-slot for available attachments.



Lathes, Precision

South Bend Lathe Works, South Bend, Ind. (Vol.81,p. 426.)

The Series R and Series N underneath - drive precision lathes are offered in 9-, 11-, 13-, 15- and 16-in. swings, and in 3 to 12 ft. bed lengths. There are no exposed pulleys, belts or gears. Quick-change-gear models are equipped for cutting 48 right- and left-hand standard screw threads, ranging from 2 to 112 per inch.

Motor and driving mechanism are inclosed in the cabinet leg. Power is transmitted from motor to countershaft by V-belt, then up to the headstock pulley by flat belt.

Lathes, Metal-Spinning

Oliver Machinery Co., Grand Rapids, Mich. (Vol.81,p.585.)

Variable-speed, unit-type, motor - driven metal - spinning lathes are available for spin-

ning sheet steel, copper, bronze, brass, aluminum, and similar metals. They are available with 12-, 16-, 20- and 24-in. swings. Lathe bed is 36 in. from the floor. Distance between centers ranges from 24 in. for the 12-in. lathe, up to 37 in. for the 24-in. lathe.

Lathes, Railroad-Shop

Consolidated Machine Tool Corp., Rochester, N. Y. (Vol. 81,p.583.)

The burnishing lathe, Fig. 1, consists of a bed, two carriages on which are mounted opposed burnishing rollers, two tailstocks and a set of ring gear chucks. Journals are burnished by specially constructed rollers mounted on Timken bearings. These rollers are opposed and float as a unit, thus relieving the centers, carriages and bed from side pressure. Three sizes of chucks are provided for handling axles having 3¾x7-in. to 6½x12-in. journals.

The Betts-Bridgeford end-drive and center-drive axle lathes, Fig. 2 and Fig. 3, have been improved by adding hardened steel ways and renewable bronze carriage linings. These machines are designed for rough and finish turning locomotive axles or similar heavy forgings. Center-drive lathes can be used for roller-burnishing journals.

Lathe, Crankshaft, Model UH-8

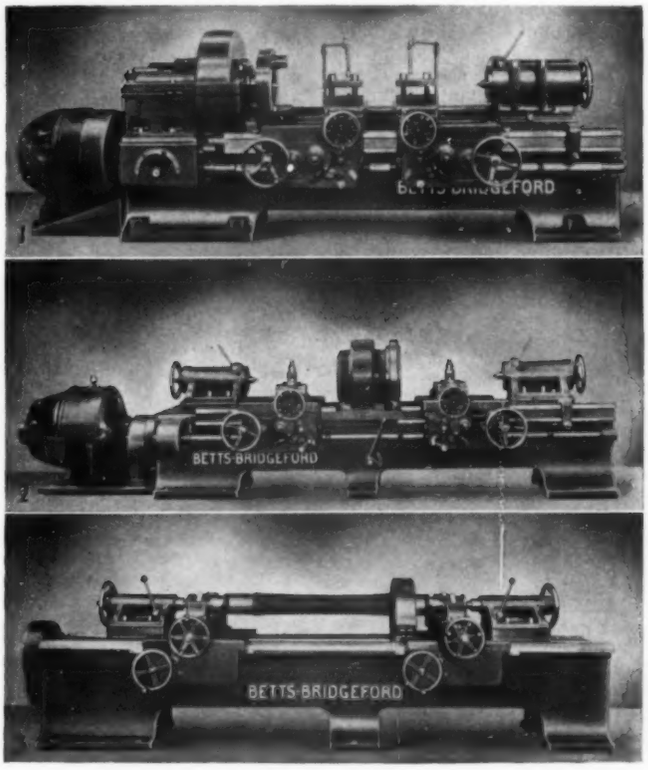
Wickes Bros., 512 N. Water St., Saginaw, Mich. (Vol.81, p. 385.)

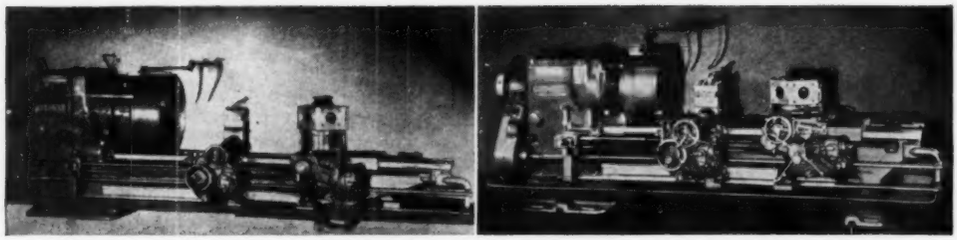
Model UH-8 automatic universal crankshaft lathe has been developed for machining large Diesel and tractor-type crankshafts. The lathe has an automatic work cycle and control is entirely through push-buttons. Hydraulic feed is used. Tailstock is movable on the bed for accommodating crankshafts of different lengths. Lathe has a swing over the cross-slide of 30 in., and is driven by a 15-hp. motor.

Lathes, Turret, Heavy-Duty

Gisholt Machine Co., Madison, Wis. (Vol.81,p.217.)

The heavy-duty turret lathe shown has a spindle with 16½ in. unobstructed bore, mounted in anti-friction tapered roller bearings. A Gisholt 34 in., 3-jaw hydraulic chuck is designed to suit a variety of





These heavy-duty turret lathes, offered by Gisholt Machine Company, have a one-piece bed and headstock construction and hardened steel ways. These units are available in a wide range of sizes

work and is operated by oil pressure from a separate hydraulic pumping unit. A coolant-compound delivery device is used on the hexagon turret to deliver cutting compound to the various tools on each of the six turret faces.

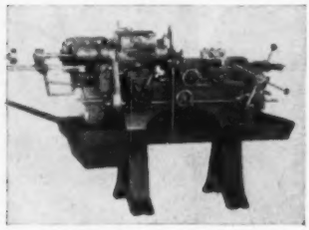
Hardened steel ways on the bed, one–piece bed and headstock cast construction and hardened steel gears are among the standard Gisholt features built into these lathes. Power longitudinal rapid traverse to both carriages is provided and large feed dials on both carriages permit visual observation of length of cuts. An automatic spindle brake is provided for stopping the chuck quickly on completion of the operation.

A force-feed oiling system is built into the machine to provide lubrication to the antifriction bearings on the spindle and the other bearings, gears and moving parts. This system insures continuous lubrication and assists in the maintenance of spindle alignment accuracy.

Lathe, Turret, No. 2

Bardons & Oliver, Inc., 1133 W. 9th St., N.W., Cleveland, Ohio. (Vol.81,p.1176.)

Design of the head of the No. 2 geared electric turret lathe centers about a standard



frame, high torque, quick-reversing motor. It has capacity for a 1-in. diameter round bar through the spindle and is claimed to be especially suited for the machining of brass, aluminum and other non-ferrous materials, as well as steel and small cast-iron castings. Turret slide has an effective motion of 7 in. relative to the saddle. Saddle apron provides six power feeds to the turret slide, ranging from 0.0035 to 0.033 in. per rev. Spindle has an American standard 6-in. spindle nose and can be equipped with standard hand or air operated chucks.

Lathes, Turret, Heavy-Duty

Gisholt Machine Co., Madison, Wis. (Vol.81,p.804.)

The No. 3AL, No. 4L and No. 5L heavy-duty turret lathes have been improved to increase the ease and speed of operation and to improve the quality of work. These turret lathes range from 6 to 12-in. bar capacity and 21 to 32-in. chucking capacity. The improved 12-speed transmission is of sliding-gear construction and has a normal speed range of 12 to 220 r.p.m. for the No. 3AL lathe and from 8 to 142 r.p.m. on the No. 4L and No. 5L machines. Feeds and rapid traverse are controlled at each carriage, independently of each other. Eight reversible feeds are selected at the aprons and range in arithmetical progression from 0.008 to 0.250 in.

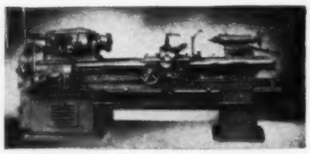
Bed and headstock of these machines is cast in one piece from nickel semi-steel. Bed ways are of steel, hardened and ground in place. Speeds are arranged in geometric progression. Spindle is mounted in tapered roller bearings at the front and a straight roller bearing at the rear.

Independent rapid traverse is provided for each carriage and may be used without disengaging the feed. An electrically operated power rapid traverse may be supplied for the cross-slide or the compound slide. Multiple V-belt motor drive is standard.

Lathes, Tool Room, Precision

Hendey Machine Co., 150 Summer St., Torrington, Conn. (Vol.81,p.714.)

A line of 18-speed geared head precision tool room and engine lathes, available in 12-, 14- and 16-in. sizes, each having an optional high and low spindle-speed range. Two levers control the primary speed changes, while one lever operates a positive tooth clutch sliding on and driving the spindle. Specifications: 12-in. lathe; length of bed, 72 in.; distance between centers, 30 in. Low-speed range, 13-700 r.p.m., high-speed range, 19-1,000 r.p.m. Specifications: 16-in. lathe; length of bed, 78 in.; distance between centers, 30 in. Low-speed range, 12-635 r.p.m.; high-speed range, 19-1,000 r.p.m. Specifications: 16-in. lathe: length of bed, 82 in.; distance between centers, 30 in. Low-speed range, 10-652 r.p.m.; high-speed range, 16-1,000 r.p.m.

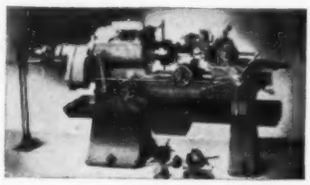


Drive from motor to headstock is through V-belts with a multiple-disk clutch and brake mounted on the driving pulley shaft. Graduations on the end of the spindle collar give an accurate means of indexing the spindle for cutting multiple threads. Apron feeds have quick in-and-out action, lever controlled. A quick withdrawing attachment gives a ½-in. travel to the cross-slide and is moved by a control lever at the left of the slide.

Lathe, Turret, Combination, No. 4-H

Millholland Sales & Machine Co., 1115 E. 35th St., Indianapolis, Ind. (Vol.81,p.422.)

Headstock of the No. 4-H combination bar and chucking lathe has been redesigned so



that controls are more convenient for the operator. Three levers control the twelve speed changes through sliding gears and clutches mounted on multiple-spline shafts. Bar capacity of the machine is 1⅝ in. diameter by 9½ in. long. Swing over ways is 16½ in.; over cross slide, 7¼ in.

Spindle speeds are shown on an indicator mounted directly above the levers. Speed range is from 40 to 1,000 r.p.m. Twelve feeds, ranging from 0.005 to 0.0136 in. per rev., are provided by the feed gearbox. Machine requires a 5-hp. drive motor and weighs approximately 3,300 lb. A complete set of bar and chucking tools is available.

Lathe, Horizontal, Special, 8-Spindle

Partool Machine Co., 9111 Schaefer Rd., Detroit, Mich. (Vol.81,p.1006.)

Designed to machine universal-joint flange bodies, this special 8-spindle rotary horizontal lathe is assembled on a 93-in. diameter fabricated steel base. Tool blocks are mounted on large diameter shafts. These

blocks are cam actuated. Work holders are designed automatically to clamp and unclamp the part before and after machining. Approximately 900 flange bodies are produced per hour. Net weight, 16,000 lb.

All reciprocating parts have pressure-lubrication from a central oiling system. Coolant is pumped up into the reservoir located on top of the machine, from which it is fed to the work in ample quantity. Provision is made for removing the chips without interfering with the action of the tool blocks. Head is carried by an anti-friction bearing.

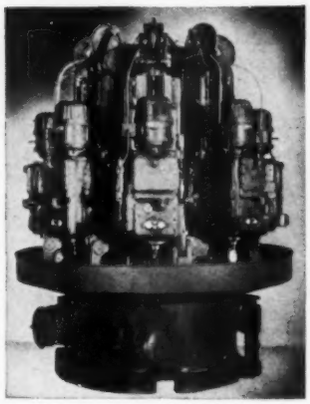
Lathe, Vertical, 8-Spindle

Sundstrand Machine Tool Co., Rockford, Ill. (Vol.81,p.340.)

Designed for rough turning and crowning cast-iron pistons, the 8-spindle vertical lathe has a heavy base on which an octagonal column is rotably mounted. On each face of the octagonal column is securely bolted a sub-base having ways on which a self-contained hydraulic unit travels vertically in an automatic cycle of rapid approach, feed and quick return which is governed by easily adjusted dogs. As the central column rotates, downward movement of the hydraulic unit feeds the work-piece against the tool to turn the outside diameter of the piston.

On the spindle of each hydraulic unit is a push-button controlled hydraulically-operated expanding chuck for holding the work-piece. At the right of the operator's position is a four-button station in which one pair of buttons starts and stops rotation of the central column.

Pivoted on the side of each hydraulic unit is a heavy bell crank having its inner end connected to a stationary adjustable rod. At the proper portion of the tool cycle, the

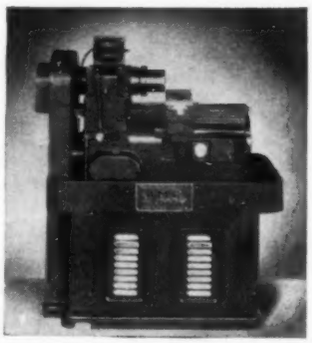


tool carried on an arm of the bellcrank turns the curved head of the piston to the correct radius. Pistons measuring 3½ in. diameter by 4¼ in. long are turned at the rate of slightly more than 400 per hour at 85 per cent efficiency.

Lathe, Lo-Swing, "IMP"

Seneca Falls Machine Co., Seneca Falls, N. Y. (Vol.81,p. 303.)

This model of the Lo-Swing "IMP" lathe is intended primarily to handle work requiring high speeds and accuracy. These characteristics make it suitable for turning heavier work, such as small pistons, bushings, and gear blanks. Feeds range from 0.0005 to 0.050 in. per revolution. The spindle is mounted on precision preloaded ball bearings

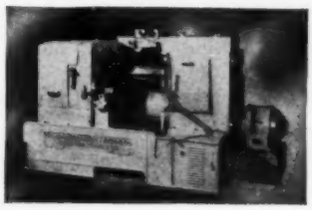


and is so constructed that spindle speeds up to 5,000 r.p.m. may be maintained. The machine weighs approximately 2,000 lb., swings 9¼ in. over the carriage and 4 in. over the cross slide. It will take 8 in. between centers.

Chucking Machine, Work-Rotating

New Britain-Grindley Machine Div., New Britain Machine Co., New Britain, Conn. (Vol. 81,p.464.)

The Model 65 six-spindle, 3¾ in. capacity, work-rotating chucking machine supplements the Models 14, 49 and 675 machines introduced some time ago. Rotating tools can be used in all positions and threading or tapping attachments can be used in any or all of the last three positions. Hydraulic chucking is operated in conjunction with "syn-

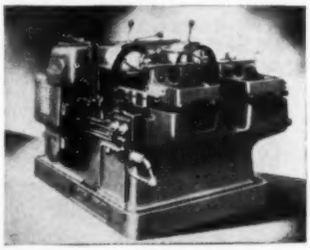


chromesh" positive jaw clutches on the spindle. Drive is through a 20-hp. motor mounted on a base at the end of the machine.

Turning Machine, "Lanhydro"

Landis Machine Co., Waynesboro, Pa. (Vol.81,p.465.)

The "Lanhydro" hydraulically operated, double-spindle turning machine is a semi-automatic, hydraulically controlled machine which completes an entire cycle automatically upon tripping a control level. Concentricity between the head of the shaft and the turned stem is assured



by using a traveling center to support the work.

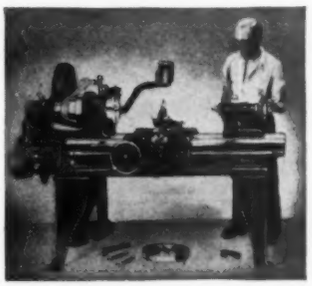
A rapid speed is provided to carry the work to the turning head. Upon reaching the turning head a coarse turning feed is used to within 0.008 to 0.010 in. of the shoulder. Where a shoulder must be faced, a very fine finishing feed is used. Length of travel of the finishing feed is adjustable for material or condition. A variable dwell time is provided for the final clean up. Upon completion of the dwell, the turning head opens under hydraulic pressure and the carriage is rapidly returned to complete the cycle.

Spindle Nose, Cam-Lock

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn. (Vol.81,p.341.)

The "Cam-Lock" spindle nose holds faceplates and chucks true and rigid with safety to the operator. Spindle nose has six wrench-operated "Cam-Locks" and the faceplates and chucks have three, four or six studs to match, depending on their size

and weight. This spindle nose has been developed under the procedure of the American Standards Association and is designated as Lathe Spindle Nose Type D-1.



Lathe-Drive, Adjustable

South Bend Lathe Works, 426 E. Madison St., South Bend, Ind. (Vol.81,p.1007.)

A pedestal-type, adjustable motor-drive unit, available in five sizes for use with 9- to 16-in. swing lathes, is mounted on a pedestal at the back of the lathe and power is transmitted from the motor to the countershaft by V-belts. Power is transmitted from the countershaft to the lathe pulley by flat leather belts.

Lathe-Drive Attachment

Sheldon Machine Co., 3253-55 Cottage Grove Ave., Chicago, Ill. (Vol.81,p.1052.)

Sheldon 10-in. lathes can be furnished with an under-motor drive attachment either in a cabinet leg, as shown, or for mounting under a bench when a bench-type lathe is required. There are eight spindle speeds, four direct and four through backgears. Sheldon 10-in. lathes swing 10¼-in. over the ways and are furnished in two bed lengths, giving 20 and 26 in. maximum center distances.

MILLING MACHINES

Milling Machine, Plain, "Producto-Matic"

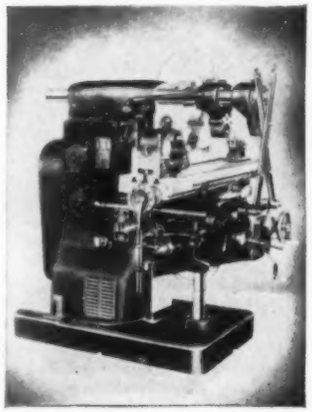
Producto Machine Co., Bridgeport, Conn. (Vol.81,p.1049.)

Arranged with power feed to the table, the No. 14 Producto-Matic knee-type milling machine has a one-piece column. V-pulleys and belts are used to secure twelve changes of spindle speeds and six changes of table feeds. Specifications: working surface of table, 26x6 in.; longitudinal power feed of table, 14 in.; cross feed of table, 7 in.; vertical feed of table, 12 in.; distance from spindle to center of table, 4 in. minimum and 11 in. maximum; range of spindle speeds, 72 to 1,300 r.p.m. in twelve steps.

Milling Machines, Universal and Plain

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 383.)

Eight plain and universal milling machines in the No. 2 and No. 3 sizes have been made available. These machines are



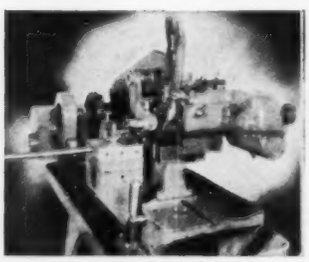
available in two styles, the "Standard Type" and the "Dual Control Type." Both styles are high-speed machines, with sixteen spindle speeds ranging from 30 to 1,200 r.p.m. "Dual Control Type" machines have control from both front and rear operating positions. Machines of this style also have 32 rates of feed, from $\frac{9}{32}$ in. to 40½ in. per min. longitudinally and ⅛ to 16⅛ in. per min. transversely and vertically. The "Standard Type" machines sixteen feed rates, $\frac{11}{16}$ in. to 26 in. per min. longitudinal and $\frac{9}{32}$ in. to 10⅜ in. per min. transverse and vertical.

Milling Machine, Hand Feed

Miller & Crowningshield, Greenfield, Mass. (Vol.81,p.224.)

Designed to meet the requirements of a sturdy machine for production milling, this V-belt

drive milling machine has a rack feed for rapid operation. A four-step V-belt pulley gives a spindle speed range from 80 to 730 r.p.m. Table is 6½x22 in. and is provided with adjustable stops for the 14½ in. horizontal feed. Knee is adjustable 9 in. vertically and cross feed is 3½ in. Power table feed can be furnished.



Milling Machine, "Productro-Matic"

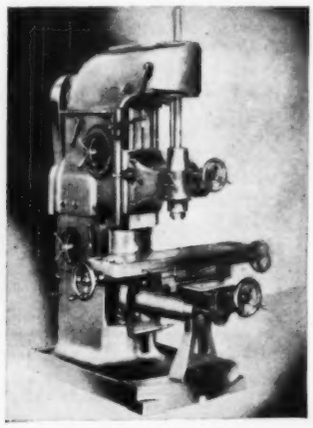
Producto Machine Co., Bridgeport, Conn. (Vol.81,p.266.)

The No. 2½ "Producto-Matic" milling machine is cam operated, providing full automatic operation without the attention of the operator. Workholding jaws can be constructed to accommodate various types of bar stock. Material of round, square, hex or any extruded or formed shape within 4 in. square can be handled.

Milling Machine, Vertical, No. 40

W. B. Knight Machinery Co., 3920 W. Pine Blvd., St. Louis, Mo. (Vol.81,p.186.)

The No. 40 vertical milling machine has sixteen spindle speeds ranging from 40 to 1,400 r.p.m. There are four spindle feed changes ranging from 0.002 to 0.010 in. Spindle has vertical power feed of 8 in. in either direction. The sixteen table feeds range from ¼ to 12¾ in. per min. Table con-

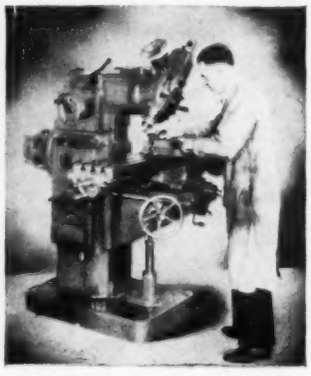


struction permits tilting the table to either side of horizontal; at the same time it can be swiveled around the column. Provision is made for dial indicator equipment. Working surface of table is 12x46 in. and distance from floor to top of table is 33 in.

Milling Machine, Vertical, No. 2

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 140.)

No. 2 vertical-spindle milling machine features a swiveling spindle head and a uniformly deep throat throughout the entire vertical travel. Spindle



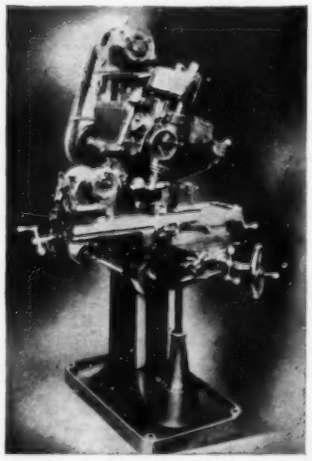
speeds range from 55 to 1,800 r.p.m. Spindle head can be set to any angle up to 90 deg. each side of vertical, in a plane parallel to the table. Spindle is provided with an axial hand movement of 3 in. in all positions. A dial at the top of the head permits adjustment of the spindle position to 0.001 in.

There are sixteen changes of power feed ranging from ½ to 18¾ in. per min. These feed changes are independent of the spindle speeds. The following ranges of automatic power feed are provided: longitudinal, 28 in.; transverse, 10 in.; vertical feed of knee, 15 in.

Milling and Shaping Machine

Cochrane-Bly Co., 15 St. James St., Rochester, N. Y. (Vol.81,p. 182.)

The No. 14 "Cobly" universal, vertical milling and shaping machine has been improved by mounting a high-speed spindle on the head and by the provision of a radius tool attachment in place of the clapper block on the shaping head. Milling and shaping heads adjust to any angle right or left, from vertical to horizontal and 45 deg. front and back from center. The high-speed spindle provides ten right-hand speeds with a maximum of 2,100 r.p.m. It is equipped with a sleeve to hold split collets from ⅛ to ⅝ in. The radius tool attachment has a longitudinal

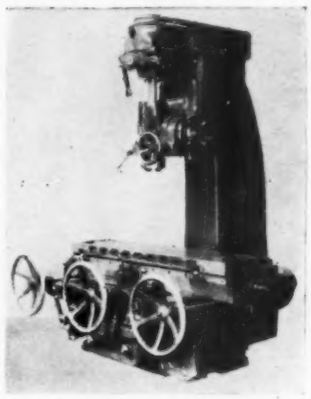


feed of 18¾ in. and a transverse feed of 9 in. Vertical adjustment of the table is 18 in. Table, inside of oil pockets, is 9x29 in.

Milling Machine, Vertical, No. 5

Reed-Prentice Corp., Worcester, Mass. (Vol.81,p.1004.)

Belt drive construction has been replaced with a helical gear drive to the spindle in the improved No. 5 vertical miller and die sinker. Specifications: longitudinal power feed, 48 in.; cross power feed, 16 in.; ver-

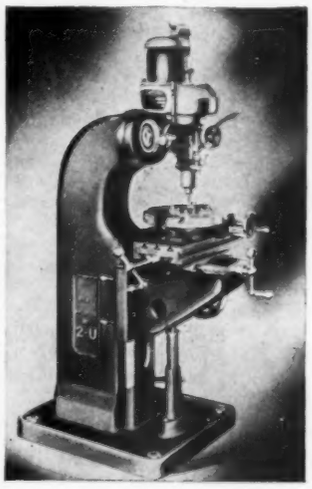


tical adjustment of head on column, 15 in.; vertical feed of spindle, 9 in.; maximum distance from end of spindle to top of table, 30 in.; distance from center line of spindle to face of column, 11¼ in.; working surface of table, 68x16 in.; height of table above floor, 33 in. The table can be moved a maximum distance of 8 in. either way. Rapid power traverse of 100 in. per min. is provided. There are eighteen spindle speeds ranging from 17 to 600 r.p.m. in the standard range and from 34 to 1200 r.p.m. in the high-speed range.

Milling Machine, Vertical, Universal Head

Reed-Prentice Corp., Worcester, Mass. (Vol.81,p.591.)

The No. 2U vertical milling machine is adapted for general tool and die work. Head can swivel to any angle parallel with the longitudinal feed and any angle up to 60 deg. can be obtained in a plane parallel to the cross feed from center toward the column. This angle is 30 deg. from center toward the front of the machine. Quill has a travel of 3½ in., and is provided with a micrometer depth gage. Rack and worm feed is provided for drilling and boring. Six spindle speeds range from 275 to 4,250 r.p.m. The circular table is 15 in. diameter and is graduated to 360 deg. Specifications: longitudinal feed, 16 in.; cross



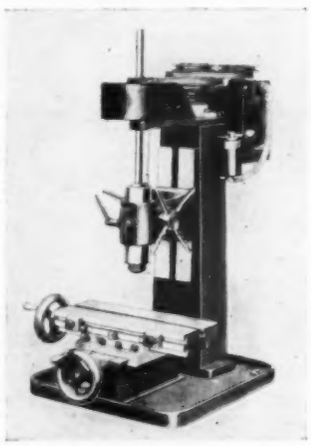
feed, 11 in.; vertical feed of knee, 15 in.; working surface of table, 20¼x8⅞ in.; net weight, 1,500 lb.

Milling Machine, Vertical, Bench-Type

Linley Bros. Co., 581 Fairfield Ave., Bridgeport, Conn. (Vol. 81,p.813.)

Designed for milling small work and for all types of drilling and boring operations, this high-speed vertical bench miller has a 14½x5½ in. working surface on the table Longitudinal travel of table is 10 in. and cross travel is 5 in. Saddle can be locked in position and an adjustable stop-gage is provided for the longitudinal travel.

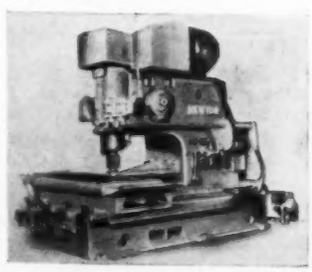
Compound drive gives eight spindle speeds of 275, 430, 550, 860, 1,250, 2,125, 2,500 and 4,-



250 r.p.m. Spindle is arranged for collets, which can be furnished in sizes up to and including ¼ in. to take straight shank mills. Vertical travel of spindle is 3 in.

Milling Machine, Profile, Type N-25

Consolidated Machine Tool Corp., Rochester, N. Y. (Vol. 81,p.1228.)



Designed for profiling radius links, eccentric cranks, link cheeks and other general-purpose profile milling of castings and forgings, the Newton Type N-25 heavy-duty vertical profile milling machine features simplicity of control and ease with which longitudinal and transverse movements of the table are obtained.

Machine is of unit-head type construction, the spindle head and its drive motor being built as a unit and fastened to the upright column. Unit illustrated has a 27x60 in. work table, with a transverse travel of 30 in., and a longitudinal travel of 52 in.

Milling Machines, Planer-Type

Consolidated Machine Tool Corp., Rochester, N. Y. (Vol. 81,p.866.)

These Newton machines are designated as unit-head, box-type milling machines and are made up of several individual milling units on a planer-type milling machine base. Unit

heads can be reset for use in any position, horizontal, vertical or at any angle. Box-type construction permits rearrangement of blocks and unit heads to accomplish any particular milling job. Each head has its own motor.

Milling Machine, "Producto-Matic"

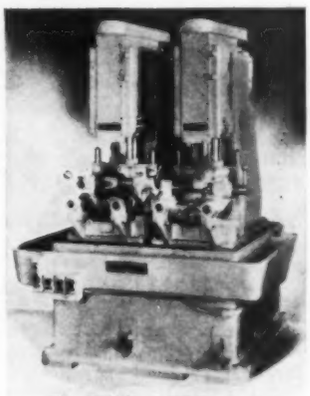
The Producto Machine Co., Bridgeport, Conn. (Vol.81,p. 1290.)

The No. 130 Producto-Matic milling machine is a full-automatic, cam-operated unit in which four separate horizontal cutter arbors machine work held in four separate stations or work fixtures. The table moves longitudinally, all movement being synchronized and automatically operated by cams. Work fixtures are positioned so that two are in the milling position while two are in the loading position at any one time. Drive is from a 15 hp. motor through a transmission gear box, using change gears for feed and speed changes. Specifications: over-all length of base, 140 in.; width of base, 48 in.; total weight of machine, 30,000 lb.; vertical travel of cutters, 8 in.; longitudinal travel of table, 16 in.

Milling Machine, Special

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich. (Vol.81,p. 305.)

Designed to rough and finish the spherical seats for pinion faces in differential housings, this special machine is constructed from standard units, including the Ex-Cell-O hydraulic power unit and vertical columns. This is a two-station milling machine, roughing oper-

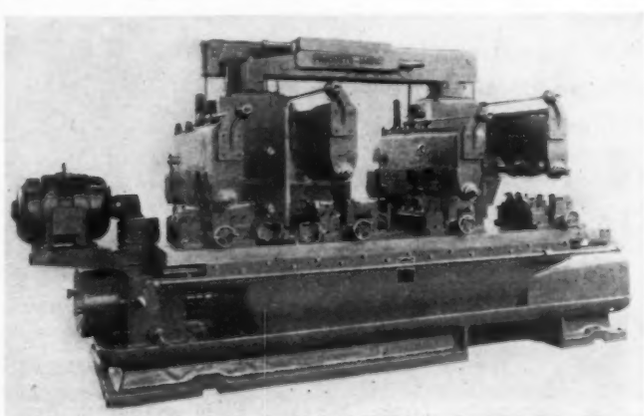


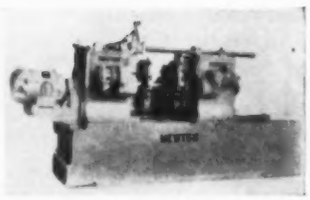
ations being performed at the first station, and finish milling operations are completed at the second station. Production is 52 parts per hour.

Milling and Center-Drilling Machine

Consolidated Machine Tool Corp., Rochester, N.Y. (Vol.81, p.1112.)

Designed to combine the operations of face milling and center drilling on both ends of shafts simultaneously, this milling and drilling machine uses a three-station universal fixture arranged to dwell against index pins while drilling and loading. Two milling spindles are mounted directly opposite each other, one in each head.





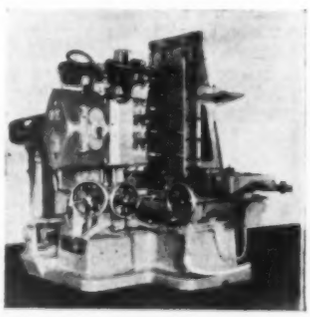
Both heads are driven from one motor mounted on a bracket near the floor. The two drilling spindles are also directly opposed. Each drill spindle has separate motor drive connected through suitable reduction gears. Pick-off gears are arranged for changing speed.

Die Sinker, Three-Spindle, Type BL-2416

Pratt & Whitney Div., Niles-Bement-Pond Co., Hartford, Conn. (Vol.81,p.995.)

Retaining the flexibility of the standard Type BL tool room machine, the Keller Type BL-2416 three-spindle die sinker makes possible the machining of multiple jobs simultaneously from a single master. This machine has a range of sufficient capacity to handle most of the work of the average tool, die or pattern shop. The principle of an adjustable tracer position has been maintained, facilitating the set-up of the master in relation to the work pieces.

Both a geared-head model and a model operated by belt drive from the jackshaft pulley to the three spindle-driving



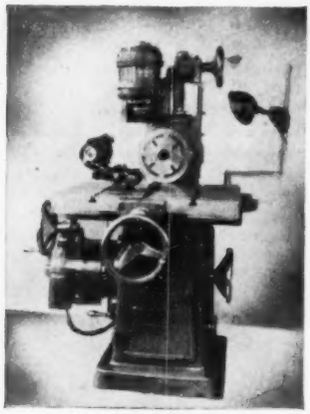
pulleys are available. Cutter drive for the geared-head machine is by multiple V-belts from a 5-hp., constant-speed motor and speeds range from 140 to 1,000 r.p.m. Belt-driven model can be belted up for single-spindle operation with a range of speed from 80 to 3,600 r.p.m. Range is from 320 to 3,600 r.p.m. with a three-spindle set-up.

Specifications: table working surface, 42x22 in.; table travel, horizontal, 24 in.; table travel, vertical, 16 in.; table travel, transverse, 8 in.; transverse spindle adjustment, 4 in.; center to center distance of spindles, 8 in.; minimum distance from working surface of table to center of lowest spindle, 1½ in.; range of horizontal and vertical feeds, 0.006 to 0.256 in. per stroke; size of machine base, 59⅛ by 57¾ in.

Diemaking Machine, Universal

Frank W. Hack, 440 N. Oakley Blvd., Chicago, Ill. (Vol.81,p. 756.)

Designed to avoid the many set-ups on one machine after another, required in the manufacture of die parts, the No. 1-A universal diemaking machine consists of a heavy base, a large compound table, a reciprocating vertical rear ram, a horizontal milling and turning spindle and a ram to which is fitted a screw-elevated master head to which other attachments are fastened. Incorporated in this head is a back-geared milling spindle which is vertically adjustable within the ram. This spindle serves for



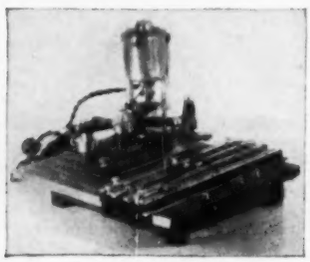
both milling and turning operations. A hacksawing frame is provided for attachment to the master head.

Rear ram has a stroke adjustable from ½ to 3 1/3 in. and a speed of 90 strokes per min. Specifications: table size, 20x30 in.; table travel, front to rear, 10 in.; table travel, left to right, 16 in.; height of table above floor, 36½ in.; overhang of attachments, 12 in.; diameter of faceplate, 10 in.; maximum swing, 20 in.; stroke of die filer, 1 in.; jig-saw capacity, 1½ in. in tool steel; net weight, 2,500 lb.

Engraver, Pantograph

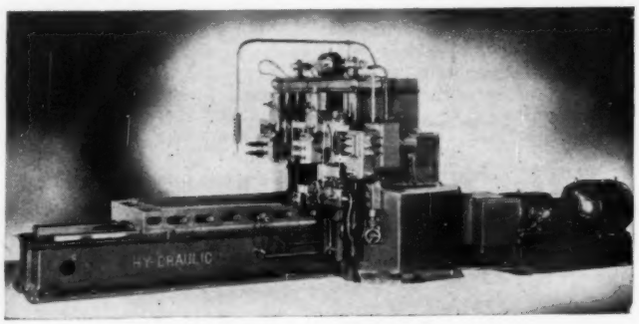
Mico Instrument Co., 10 Arrow St., Cambridge, Mass. (Vol.81, p. 1234.)

Cutter spindle of this table-top engraver is designed to permit operation at 8,000 to 12,000 r.p.m. Among the features claimed for this machine is that the copy and the work are in sight at all times and



are right-side up. Pantograph is of a three-dimensional type so that the tool is lifted from the work when the tracing point is taken out of a letter. Four reduction ratios are provided, giving letters two-thirds, one-half, one-third and one-quarter the size of the copy. Work as thick as 2 in. can be handled. Work table is 9½ in. wide and maximum clearance between copy carrier and pivot stud is 7 in. Three lines of 30 characters each can be assembled on copy carrier.

PLANERS AND SHAPERS



Planer, "Hy-Draulic," 48x48 in.

Rockford Machine Tool Co., Kishwaukee and 23rd St., Rockford, Ill. (Vol.81,p.673.)

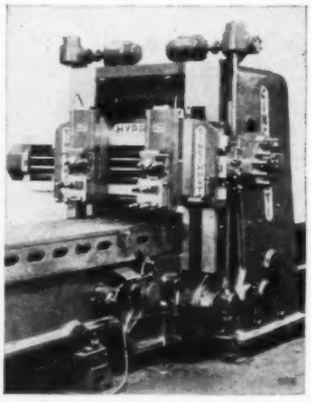
The double-housing, 48x48 in. heavy-duty "Hy-Draulic" planer uses a constant-speed motor, with relatively simple controls, for driving the hydraulic unit. Cutting speeds are independent of return speeds and both have infinite adjustment between high and low limits. Reversals of table movement are claimed to be quick and smooth, short strokes can be made at near shaper speeds. Table can be stopped, inched, or reversed at any point in its travel. Cross feeds to heads is hydraulic. Hydraulic tool lifters are provided for all heads.

The planer is available with 8, 10, 12, 14, 16 and 18 ft. length of stroke. Specifications: width of table, 44 in.; depth of table, 9¼ in.; maximum distance, table to tail, 48½ in.; maximum travel of right- and left-hand rail-heads, 55 in.; maximum vertical travel of rail-head tool, 12 in.; horizontal adjustment of side head, 11 in.; height, floor to top of table, 32 in.; weight of 10 ft. machine, less electrical equipment, 54,000 lb.

Planer, "Hypro" Frog and Switch

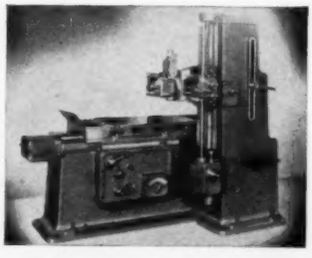
Cincinnati Planer Co., Cincinnati, Ohio. (Vol.81,p.1000.)

The "Hypro" 42-in. frog and switch planer was designed primarily for the production of railroad track assemblies. It also is arranged for use in the production of automotive body dies. Cross-rail heads and side heads can be provided to suit changes in requirements. Feed is obtained either before or after the cutting stroke has taken place and increments range from 0.10 to $\frac{5}{16}$ in. Maximum feed can be increased to $\frac{7}{8}$ in., should this be required. Total height of the machine above the floor level is 114 in., width including main motor drive is 133 in. and the total length, when built for a 22-ft. table, is 48 ft. Total weight, 94,000 lb.



Shaper, Openside, "Hy-Draulic"

Rockford Machine Tool Co., Kishawaukee and 23rd St., Rockford, Ill. (Vol.81,p.712.)

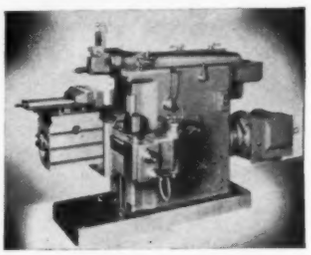


This 36-in. "Hy-Draulic" openside shaper has three ranges of cutting speeds and speeds and feeds are infinitely adjustable between maximum and minimum limits. Centralized controls provide easy engagement of power transverse feed of tool slide on rail in either direction, of tool slide up or down, and manual adjustment of both. Specifications: maximum stroke, 38½ in; minimum stroke, 1 in.; vertical travel of tool, 9 in.; horizontal travel of tool, 30 in.; vertical adjustment of cross rail, 24 in.; working surface of table, 21½x36 in. Cutting speeds range from 0 to 110 ft. per min. Weight is 8,700 lb.

Shaper, Ram Type, "Hy-Draulic"

Rockford Machine Tool Co., Kishawaukee and 23rd St., Rockford, Ill. (Vol.81,p.712.)

Controls of the 12-in. "Hy-Draulic" high-speed shaper are centralized to reduce operator fatigue. Adjustments are made without the use of tools. Universal tilting-top table and power down-feed to the head are standard equipment. Length and position of ram-stroke is



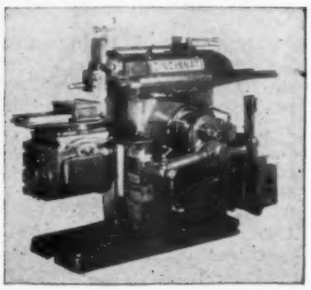
easily adjusted without stopping the ram or using wrench or crank.

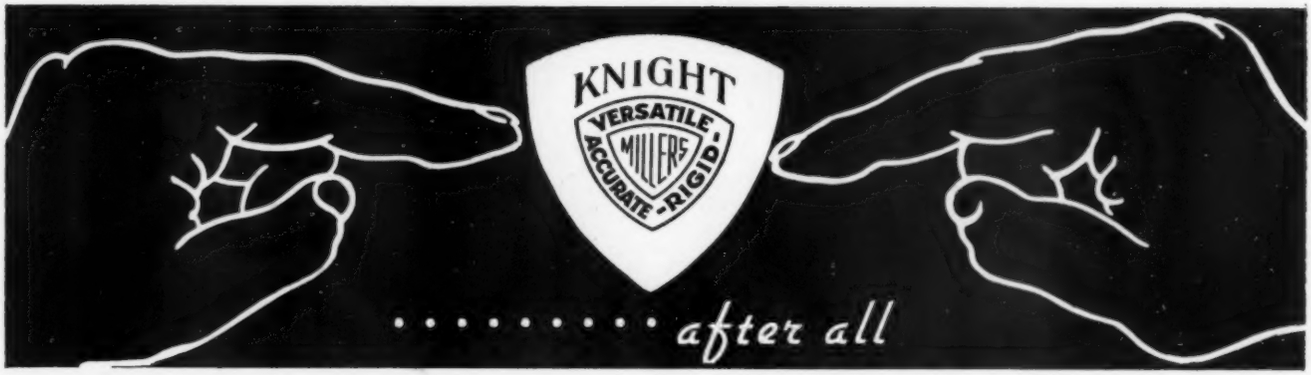
Specifications: maximum stroke, 13 in.; minimum stroke, ½ in.; maximum speed, strokes per min. 400; maximum travel of table on rail, 19¾ in.; vertical hand adjustment to head, 5½ in.; feed range for power down-feed, 0.0025 to 0.030 in.; cutting speed range, 5 to 150 ft. per min.; cutting force at 75 ft. per min., 2,400 lb.; table feed range, 0.0025 to 0.090 in. Weight, 3,000 lb.

Shaper, High-Speed

Cincinnati Shaper Co., Cincinnati, Ohio. (Vol.81,p.871.)

The rocker arm and link of this high-speed shaper are of aluminum alloy to reduce the weight of the reciprocating parts and to insure smooth reversal at 200 strokes per min. A clapper retainer, that can be made inoperative at will, re-





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⅓ of the 1937 orders for the

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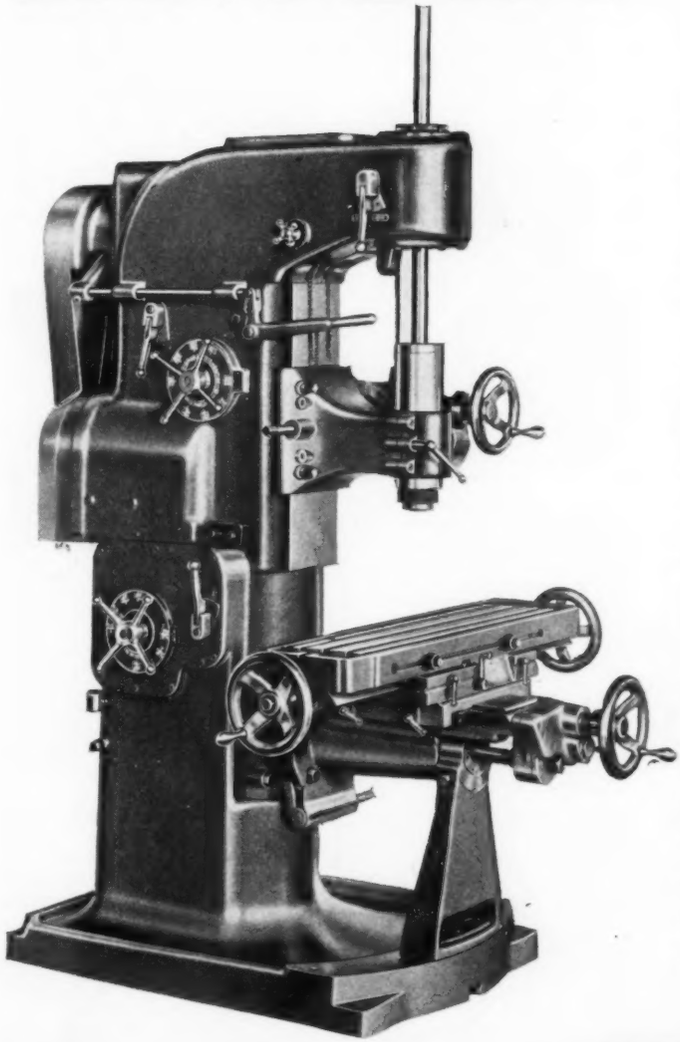

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The New Knight 30–

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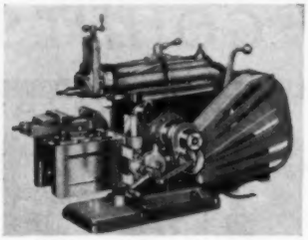
stricts the upward swing of the clapper and insures its proper operation. Head also can be equipped with a tool lifter. The machine has a 16 in. capacity with 200 strokes a minute. Net weight, 4,500 lb.

Shaper, Bench-Type

Atlas Press Co., Kalamazoo, Mich. (Vol.81,p.1049.)

Ram driving mechanism of the No. 7 bench shaper is of the bull-gear type and a V-belt drive from the motor to the

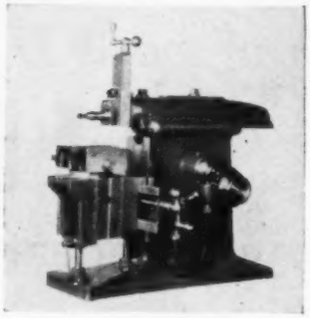


bull-gear spindle provides four speeds ranging from 45 to 200 strokes per min. Specifications: stroke, with quick return, $\frac{1}{2}$ to $7\frac{3}{8}$ in.; cutting speeds, $3\frac{1}{2}$ to 116 ft. per min.; horizontal table travel, $8\frac{1}{2}$ in.; vertical table travel, $4\frac{1}{2}$ in.; maximum distance from table to ram, $5\frac{1}{8}$ in.; minimum distance of table to ram, $\frac{5}{8}$ in.

Shaper, Bench-Type

Automotive Maintenance Machinery Co., 2100 Commonwealth Ave., North Chicago, Ill. (Vol.81,p.1236.)

Available mounted on a portable work bench that can be rolled from job to job, or for mounting on standard benches, this 6-in. crank shaper is equipped with a three-step cone pulley. Automatic cross feed to the table has four variations. Vise has graduations on its bottom edge for angular work and the tool head is likewise graduated from 0 to 90 deg.

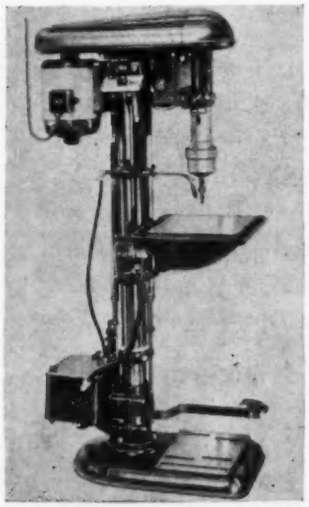


TAPPING AND THREADING MACHINES

Tapping Machine, "Universal"

Procunier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill. (Vol.81,p.1005.)

Designed to tap a wide range of materials and sizes, the "Universal" tapping machine has five operating speeds and two interchangeable tapping heads. Long helical springs,

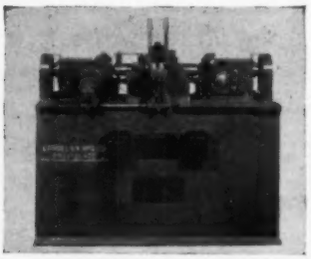


adjustable over a wide range, maintains preset tapping and reversing pressures. Operating speeds range from 385 to 2,240 r.p.m. and interchangeable tapping heads afford a capacity ranging from a No. 8 to $\frac{5}{8}$-in. diameter taps inclusive.

Threading Machine, Double End

Langelier Mfg. Co., Providence, R. I. (Vol.81,p.1005.)

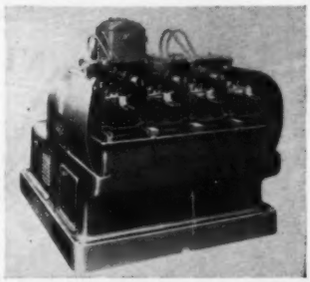
This double-end machine, designed for threading door-knob spindles, consists of a magazine-fed, horizontal, duplex-opposed machine using two No. 11 drilling units driven by individual motors. Parts are loaded into a vertical magazine and shifted to the operating station by means of a cam.



Threading Machine, Four-Spindle

The Landis Machine Co., Inc., Waynesboro, Pa. (Vol.81,p. 1281.)

Movement of the die head spindles and the opening of the work grips of this semi-automatic four-spindle threading

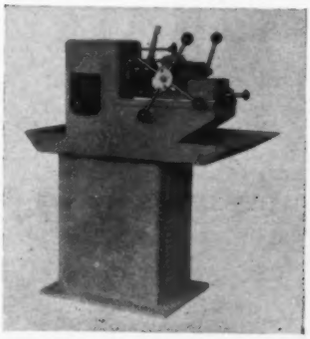


machine is actuated by cams. This machine will handle bolts of any length from $\frac{1}{4}$ to $\frac{3}{4}$ in. in diameter and will cut a maximum thread length of $3\frac{1}{2}$ in. Operating cycle reduces manual labor to merely placing and removing of work from the grip. The four die-head spindles are closely coupled.

Threading Machine, No. 14

Geometric Tool Co., New Haven, Conn. (Vol.81,p.1174.)

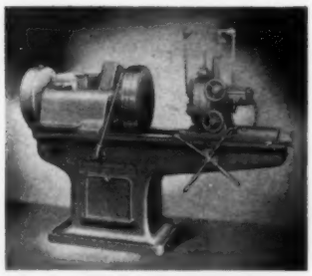
Intended for the precision threading of duplicate parts, the No. 14 threading machine will cut standard pitches up to $\frac{5}{16}$ in. and fine pitches in larger sizes. Either a Style KD diehead with conventional milled or tapped chasers, or the Style TR diehead with tangential or



circular chasers may be employed. An automatic work gage insures proper setting of the work. This gage swings out of the way when the work is tightened in the vise. Pick-off change gears permit a wide range of threading speeds.

Threading Machine, Pipe, 2-in.

Landis Machine Co., Waynesboro, Pa. (Vol.81,p.185.)



Revisions in design of the 2-in. Landis pipe threading and cutting machine include a heavier bed and guarded ways. Speeds of the chuck range from 30 to 163 r.p.m. Headstock is mounted directly on the bed. This machine has a capacity for threading pipe from $\frac{1}{8}$ to 2 in. diameter, inclusive. Carriage travel is 14 in.

Threading Machine, Pipe, Portable

Landis Machine Co., Waynesboro, Pa. (Vol.81,p.674.)

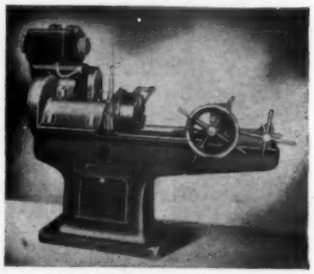
The 2-in. capacity "Little Landis" pipe threading and cutting machine is available as a portable unit. Guide wheel and handle are detachable and

permit the machine to rest solidly on its own base. The unit has capacity for threading pipe from $\frac{1}{4}$ to 2 in. diameter or bolts up to $1\frac{1}{2}$ in. diameter.

Threading Machine, Pipe, 2-in.

Landis Machine Co., Waynesboro, Pa. (Vol.81,p.306.)

An improved design of the 2-in. threading machine is regularly supplied with gears to cover a range of 31 to 118

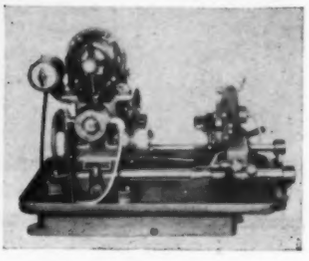


r.p.m. This machine is furnished with either the standard rotary diehead or the heat-treated "Lanco" head.

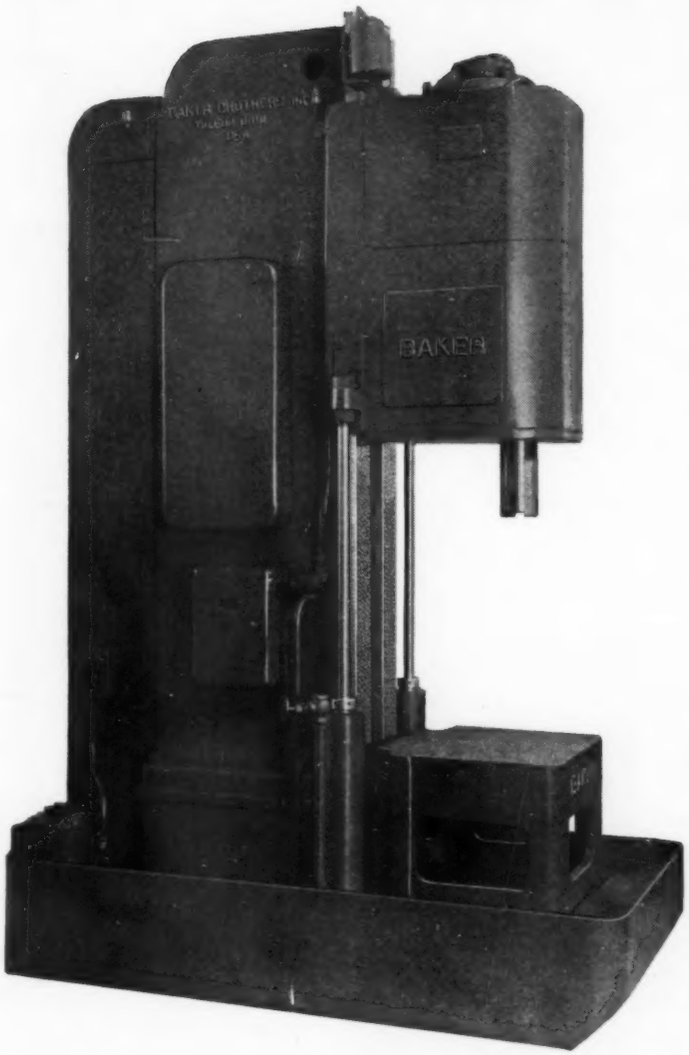
Threading Machine, Pipe, No. 512-A

Oster Mfg. Co., 2057 E. 61st Place, Cleveland, Ohio. (Vol.81, p.1110.)

Designed to round out a line of $\frac{1}{8}$- to 2-in. pipe threading machines, the No. 512-A "Tom Thumb" machine is equipped with a diehead that is integral



It's Smart TO BUY!



It's good judgment to buy Baker machines. Whatever business conditions exist, the wisdom of investment in cost saving equipment is proved by experience. "Baker" means cost saving with the built-in plus of quality.

The standard 30 HO hydraulic feed machine (illustrated) shows the usual sound Baker design. Important details that insure accuracy, speed and long life are also included. Automatic lubrication, helical gears in head, multiple splined spindle mounted on preloaded ball bearings, patented "Twin Pull" feed, and lower drive to spindle—these are not necessary for an ordinary machine. They are, however, required to meet Baker performance standards.

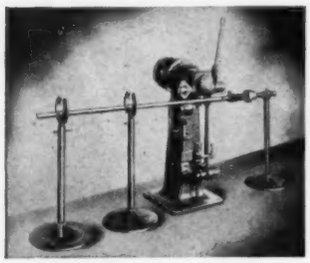
The 30 HO is provided with pick off gears for speed changes; is totally enclosed for safety and easy maintenance; and can be furnished with multiple head, indexing table and special fixtures for special requirements. It is one size of a complete range of standard machines.

For your drilling, boring, tapping, and reaming requirements, consider machines built for better performance. Submit a blueprint or sample part for a recommendation by our engineering department.

BAKER BROTHERS, Inc., Toledo, Ohio
Newark, N. J., Office 1060 Broad St.

★ BAKER ★

with the carriage, insuring accurate work and increased die life. Over-all length of the machine is 34 in., width is 21 in., and height is 24 in. Net weight, 375 lb.



Pipe Cutter, Model F

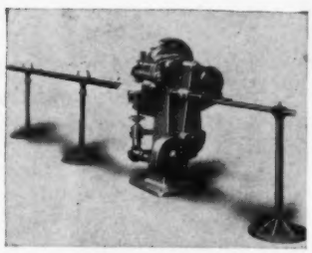
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich. (Vol.81,p.428.)

Model F roller pipe cutting machine has capacity for ½- to 2-in. pipe. Cutter wheel is a thin heat-treated tool-steel disk. Rollers, which support the pipe, are raised to the revolving cutter by a combination hand and foot lever control. Machine can be fitted with a set of small rollers for ⅛- to ⅜-in. pipes.

Pipe Cutter, Semi-Automatic

Landis Machine Co., Waynesboro, Pa. (Vol.81,p.869.)

Improvements in design of the Geist roller pipe cutter include operation of the rollers by cam action. Both the hand lever and the pedal have been eliminated and movement of the rollers in a vertical plane is actuated by a gear-driven disk cam. Operator is relieved of all work except the feeding of pipe into the machine.

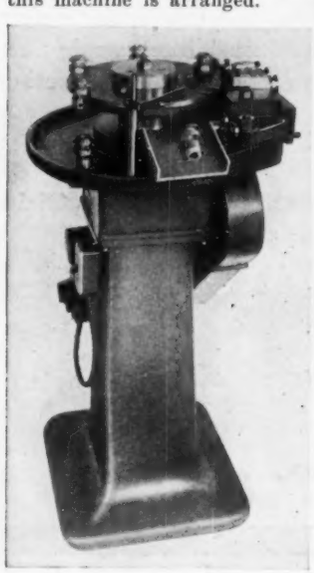


MISCELLANEOUS MACHINES

Marking Machine, High-Speed, No. 20-R

Noble & Westbrook Mfg. Co., 20 Westbrook Ave., East Hartford, Conn. (Vol.81,p.1112.)

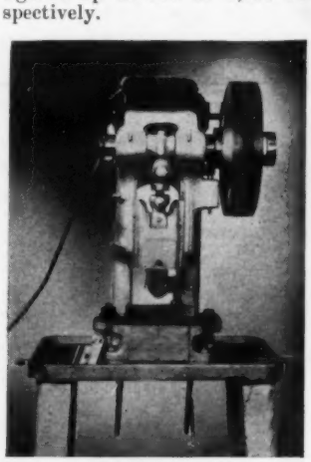
Developed for marking chuck bodies, the No. 20-R marking machine is power driven and the operator has only to place the articles in the feeding position. They are then carried to the marking dies by means of a revolving dial. Marking dies consist of three sets of numbering and descriptive marking segments which are arranged so that the inscription is spaced centrally between the key holes on the chuck body, for which this machine is arranged.



Marking Machine, Press, Wire

Numberall Stamp & Tool Co., 379 Huguenot Ave., Huguenot Park, Staten Island, N. Y. (Vol.81,p.586.)

This power press is equipped with an automatic numbering head which stamps consecutively $\frac{1}{16}$ in. figures in a vertical position on pieces of test wire. Three or four wheels are used in the numbering head to stamp figures up to 999 or 9,999 respectively.



Marking Machine

Noble & Westbrook Mfg. Co., 20 Westbrook St., East Hartford, Conn. (Vol.81,p.426.)

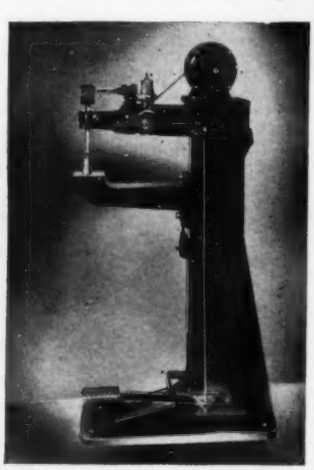
No. 41-D graduating machine can be supplied for marking micrometer dials and similar articles up to 8 in. in diameter. Work spindle is mounted on roller bearings and is removable so that different types of spindles can be used.

Work and work spindle are geared to the marking die in order to hold zero line location, as well as to maintain accuracy of the graduations.

Hammer, Riveting, Wide-Gap

High Speed Hammer Co., 305-321 Norton St., Rochester, N. Y. (Vol.81,p.303.)

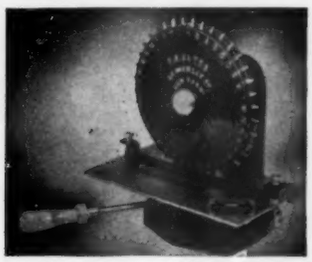
A series of wide-gap riveting machines. which accommodate exceptionally large parts, has been made available. Aside from the increased depth of throat, these machines are essentially the same in construction as the standard hammers. which have 6 in. throat depth.



Marking Machine, Nameplate

H. O. Bates, 68 Barclay St., New York, N. Y. (Vol.81,p. 589.)

Name plates up to 8 in. long can be stamped on this machine. Single letters or figures are replaceable and extra sizes of characters can be furnished with each machine. Table advances automatically after each impression. Spacing is adjustable. Both curved and straight lines can be marked. Stamps ranging from $\frac{1}{16}$ to $\frac{1}{16}$ in. can be used.



Screw-Driving Machine, Automatic

Akron Automatic Machine Co., 100 Beach St., Akron, Ohio. (Vol.81,p.259.)

This full automatic screw-driving machine will handle any size or type of machine or wood screw without major changes. It is also adaptable to driving nuts on stud bolts or bolts already in position.

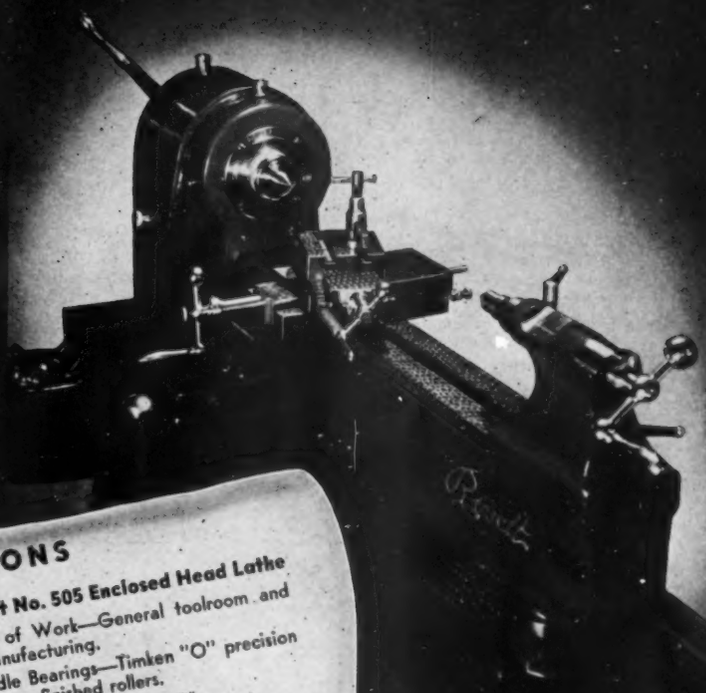
With an extra magazine and track it will assemble nuts and bolts through small parts. It is possible to drive the screw with the head touching the face of a vertical wall as high as 4 in. Tightness to which screws are driven is controlled by a multiple-disk friction clutch.

Clincher, Underfeed Type

Tomkins-Johnson Co., Jackson, Mich. (Vol.81,p.146.)

This "Clinchor", for setting clinch nuts, has a 24-in. throat and is particularly adaptable for large, awkward pieces. Throat depths have previously been limited to 8 in. Clinch nuts automatically are fed to

WINNERS for 1938



SPECIFICATIONS

Rivett No. 104 Internal Grinder

Type of Grinding—straight and taper holes and bevels.
Grinding Capacity—from smallest up to 3" dia. hole.
Automatic Table Travel—1/4" to 2" or 1/2" to 4".
Swing over Table—8".
Collet Capacity—7/8" max. diameter.

Rivett No. 608 Screw-Cutting Lathe

Type of Work—straight, taper and ball turning, boring, facing, milling, threading, spiral cutting, slotting, relieving and grinding.
Swing over Bed—8 1/2".
Length of Bed—40".
Collet Capacity—5/8" and 1" max. diameters.

Rivett No. 505 Enclosed Head Lathe

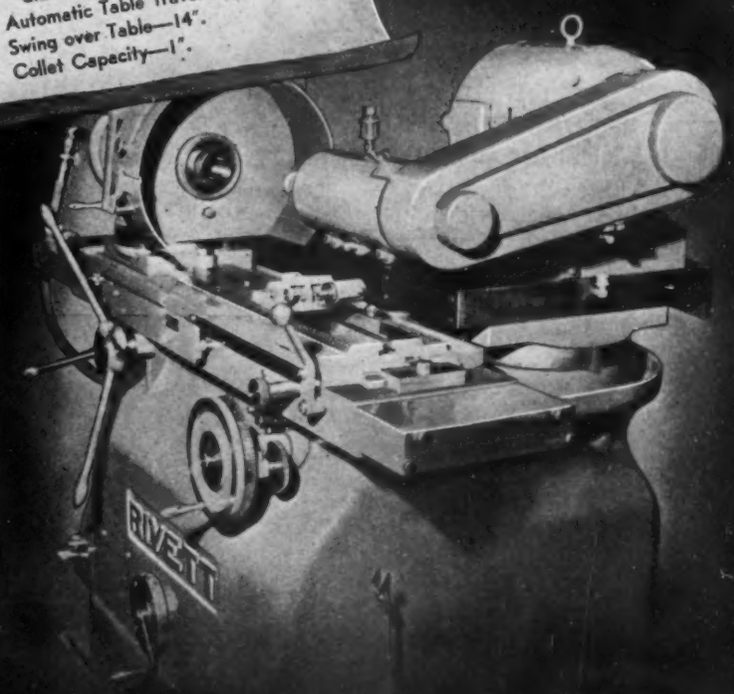
Type of Work—General toolroom and manufacturing.
Spindle Bearings—Timken "O" precision mirror finished rollers.
Swing over Bed—8" and 9".
Length of Bed—38"
Collet Capacities—3/4" and 1" max. diameters.

Rivett No. 112 Internal Grinder

Type of Grinding—straight, bevel, two angle and straight and bevel at one setting.
Grinding Capacity—1/2" to 8" hole diameter.
Automatic Table Travel—1/2" to 8".
Swing over Table—14".
Collet Capacity—1".

RIVETT No. 104
Internal Grinder

RIVETT No. 505
Enclosed Head Lathe

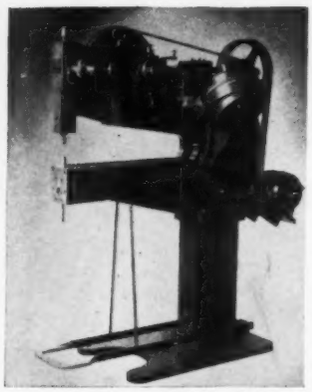


RIVETT No. 608
Screw-Cutting Lathe

RIVETT No. 112
Internal Grinder

RIVETT LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS.



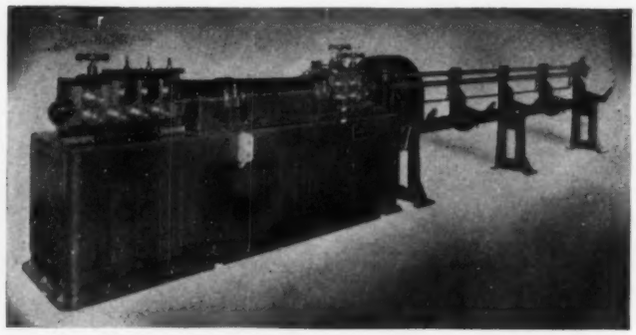
the ram. Work is located over the nut, which is then set by a single stroke of the ram.

rough straightens the wire before it enters the rotary straightener or flier. The standard five-die steel rotary straightener is designed to take hardened iron, bronze, or babbit straightener dies.

Screw-Driving Machine, Motor-Driven, Model 4A

Henry Carlander, 525 W. 146th St., New York, N. Y. (Vol.81, p.1003.)

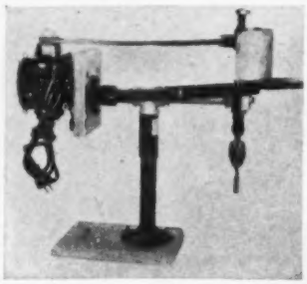
Screws can be put in or tightened at the rate of approximately 1,200 per hour with the Model 4A motor-driven screwdriver. This unit has a spindle movement of 2 in. and is held in upper position by a spring catch when not in use. In the normal position the end of the screwdriver is 5 in. above the bench and the 2 in. movement brings the screwdriver within 3 in. of the bench. This model has a 6-in. vertical adjustment.



Straightener and Cutter, Wire

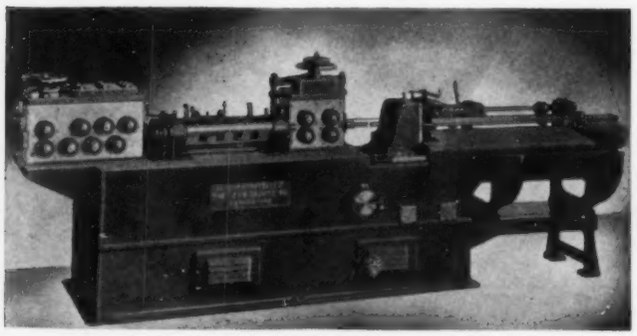
F. B. Shuster Co., New Haven, Conn. (Vol.81,p.630.)

No. 4A "Dual Control" automatic wire straightening and cutting machine feeds wire from the coil, straightens it and cuts it to accurate lengths. All parts, including the variable-speed drive units, are mounted on a welded-steel base. Machine can be furnished as a constant-speed unit.



Straightener and Cutter, Wire

Lewis Machine Co., 3441 E. 76th St., Cleveland, Ohio. (Vol.81,p.469.)

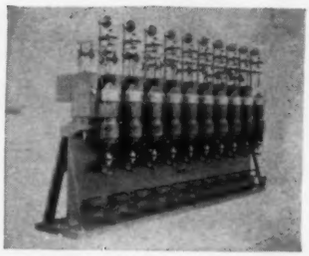


The No. 10-F "Travel-Cut" automatic wire straightening and cutting machine has capacity for rod ranging from $\frac{3}{32}$ to $\frac{5}{8}$-in. diameter. Wire is fed from the coil, straightened, gaged to accurate length and cut on the fly. A roll straightener removes the coil bow and

Insulating Machine, Wire, Ten-Spindle

Syncro Machine Co., 187 Sylvan Ave., Newark, N. J. (Vol.81, p.898.)

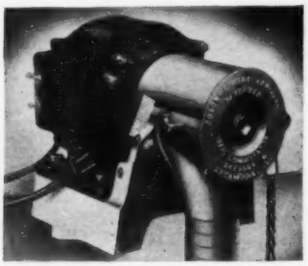
Consisting of ten individual spindles mounted on one frame, this wire insulating machine is designed for serving wires of the finer sizes with the various insulations that are being used commercially and, also, several new types of insulations that are being developed. Machine is provided with a frequency changer set which makes it possible to operate any of the flyers, independently of each other, at three different flyer speeds. These speeds are 3,300, 5,000 and 7,000 r.p.m.



Stripper, Wire

Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill. (Vol.81,p.343.)

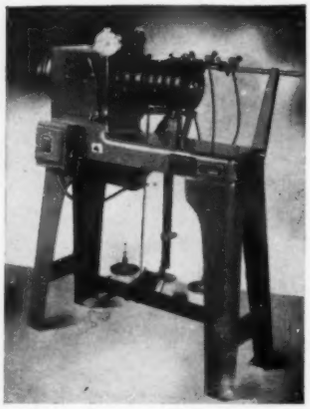
The "Colonial" wire stripper employs the principle of centrifugal action, which eliminates the necessity for springs and levers. The double-edge blades in the stripping chamber fly outward in motion and a slight pressure on the pedal closes the blades to within 0.001 in. of the diameter set by the dialed micrometer gage. When the wire is inserted into the stripper, insulation is cut clean and the wire is properly twisted and polished.



Winder, Coil, Semi-Automatic

Globe Tool & Engineering Co., Dayton, Ohio. (Vol.81,p.217.)

Available in three sizes, these semi-automatic coil winders provide automatic leveling of wire. One or more coils, up to six, can be wound at one time. The No. 2 machine shown has capacity for coils ranging from 3 to 8 in. in diameter, having a width of $\frac{5}{8}$ to 6 in. It will handle wire sizes ranging from No. 35 to 16. No. 3 unit will make coils from 4 to 12 in. in diameter with widths from $\frac{5}{8}$ to 6 in. and will handle wire sizes from No. 35 to 12. No. 3B machine is a back-geared unit and will make coils from 6 to 24 in. diameter with widths from $\frac{5}{8}$ to 6 in. from wires ranging from No. 20 to 8.



Winder, Coil, Universal

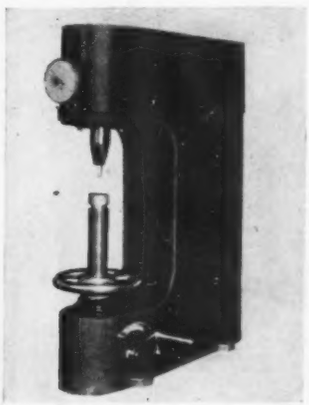
Globe Tool & Engineering Co., Dayton, Ohio. (Vol.81,p.223.)

The No. 2 universal coil winder will wind almost any coil from $\frac{3}{4}$ to 8 in. in diameter with coil widths from $\frac{1}{4}$ to 8 in. and wire sizes from No. 30 to No. 16. The machine is powered to wind two or three wires at a time as large as No. 16 on 6-in. diameter coils. This machine is for hand-guided wire only and is not equipped with an automatic leveling device.

Tester, Hardness, Universal

The Pyro-Electro Instrument Co., 6659 Chase Road, Dearborn, Mich. (Vol.81,p.1237.)

Model H direct-reading universal hardness testing machine is calibrated for $\frac{1}{16}$ and $\frac{1}{8}$ in. and 5mm. balls, as well as for the standard penetrator diamond. Load is applied by a



IF YOU HAD TOLD US IN ADVANCE EXACTLY WHAT YOU WANTED IN A HIGH-PRODUCTION BOLT-THREADING MACHINE . . .

RAPIDUCTION
No. 922—capacity ½" to 2¼"; also available in ¾" to 1½" size (No. 915) both single and double spindle types.

. . . . IT WOULD HAVE ADDED UP TO LESS THEN WHAT THE RAPIDUCTION GIVES YOU

BEFORE STARTING to design the RAPIDUCTION, Oster-Williams engineers consulted shop men in a wide variety of plants to get their ideas as to what improvements they desired in bolt-threading equipment. Each one gave us things to think about but not one of them covered ALL the improvements that are combined in the RAPIDUCTION.

Today the combined results of that study plus the inventive talent of Oster-Williams engineers are being capitalized in a big way by Rapiduction owners. Users are unanimous in praising not only the high-speed precision operation of the machines but also the host of valuable "minor details" which make for greater production, lower upkeep and simplified control.

Threading Headquarters Since 1893

THE OSTER MANUFACTURING COMPANY

Sales Office: 2049 East 61st Street, Cleveland, Ohio
Factories: Erie, Pennsylvania and Cleveland, Ohio
New York City Showroom and Office, 292 Lafayette Street
Philadelphia Showroom and Office, 111 North 3rd Street

OSTER THREADING EQUIPMENT WILLIAMS

RAPIDUCTION BOLT-THREADING MACHINES

hand-operated crank. Standard machine has a vertical capacity of 8 in.; with load capacities of 60, 100 and 150 kgs. with no change in minor load. Throat depth is 7 in. and approximate weight is 250 lb.

Testers, Hardness, "Rockwell"

Wilson Mechanical Instrument Co., Inc., 383 Concord Ave., New York, N. Y. (Vol.81,p. 1238.)

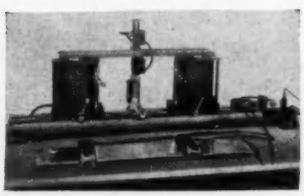
Improvements announced in "Rockwell" hardness testers are claimed to permit precision testing in dusty atmospheres. Models may be obtained in all

sizes with a hinged cowl, shielding the testing head from grit and dust. An improved valve system in the oil-dash-pot insures the effectiveness of the speed adjustment, even at the beginning of the stroke.

Testing Machine, Fatigue, "Rayflex"

Raytheon Mfg. Co., 190 Willow St., Waltham, Mass. (Vol.81, p.868.)

The "Rayflex" fatigue testing machine makes tests possible on full sized parts, or at least parts sufficiently large to represent metal, method of



preparation and surface condition used in actual service. Specimen is vibrated at its own natural period, being supported and held at the nodes by electromagnets. These are actuated by an oscillator-amplifier combination. Magnaflux equipment is included with the fatigue tester and is used to locate failure in the specimen.

Tester, Fatigue

G. N. Krouse, 101 E. Dominion Blvd., Columbus, Ohio. (Vol.81, p.895.)

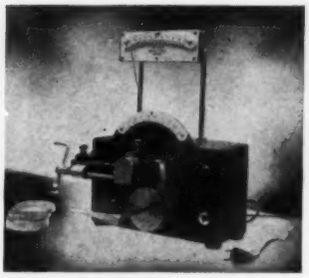
Designed to test metal sheet or plate up to $\frac{3}{8}$ in. thick at 1,750 cycles per min. using a

centilever-beam type specimen, this plate fatigue testing machine is of the fixed deflection type and uses the specimen as its own dynamometer. Fixed end of the specimen is held in a vise, which may be tilted to vary the range of bending.

Tester, Stiffness

Tinius Olsen Testing Machine Co., 500 N. 12th St., Philadelphia, Pa. (Vol.81,p.757.)

This sensitive stiffness tester of 5 in.-lb. capacity is suitable for determining the elasticity, plastic flow, hardness and bending strength of very fine wire, thin sheet. foil, plastic film, paper products and other thin and flexible materials. Uniform testing speed is provided by a self-contained motor drive.



Testing Machine, "Abraser"

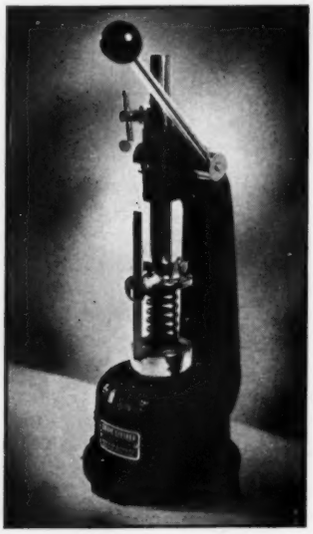
Taber Instrument Co., North Tonawanda, N. Y. (Vol.81,p. 715.)

Model J "Abraser" is a portable precision testing machine for measuring wear resistance, toughness, adhesion and run-off qualities of surface finishes. Mechanism consists primarily of a power driven specimen holder and two pendulum arms on which are mounted wheels of a resilient abrasive composition. The wheels are offset relative to the center of the specimen holder, resulting in a cross-cross abrading action. Toughness and adhesion are measured by a blade inserted in the scale beam.

Tester, Spring

Link Engineering & Mfg. Co., 1054 W. Baltimore Ave., Detroit, Mich. (Vol.81,p.183.)

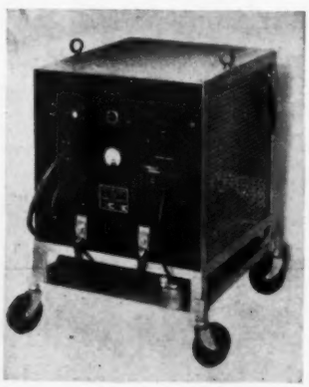
Available in two capacities, this spring checker is designed for production testing of coil springs. Model No. 1 has a 50-lb. capacity and is calibrated in $\frac{1}{4}$-lb. units; Model No. 2 has 250-lb. capacity and is calibrated in 1-lb. units. Overloading is prevented by relieving the weighing unit of further load when maximum capacity has been reached.



Magnetizing Units, Magnaflux, Model K3

Magnaflux Corp., 333 N. Michigan Ave., Chicago, Ill. (Vol.81, p.894.)

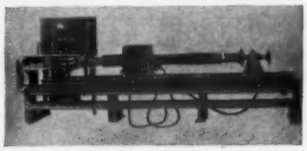
The Model K3 magnetizing unit has been developed for general use in locomotive shops for the inspection of side rods, valve motion parts and piston rods, by the Magnaflux method. It is applicable to the inspection of large shafts and for the examination of welded seams by either the cable or the "magnetic leech" method.



Magnetizing Units, Magnaflux, Model HC-1025

Magnaflux Corp., 333 N. Michigan Ave., Chicago, Ill. (Vol.81, p.894.)

Designed particularly for the inspection of railway axles, the Model HC-1025 magnetizing unit is capable of supporting loads of approximately 3,000 lb. It is a transformer unit rated for intermittent service and having a maximum ca-

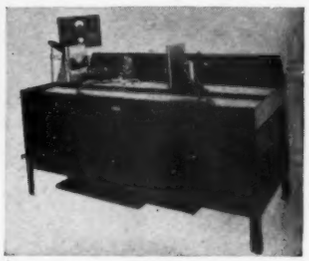


pacity of 5,000 amp. Axles can be examined for both transverse and longitudinal defects. The unit is approximately 13 ft. long, 5 ft. high and 30 in. wide and will accommodate parts up to 10 ft. long.

Magnetizing Units, Magnaflux, Model AN

Magnaflux Corp., 333 N. Michigan Ave., Chicago, Ill. (Vol.81, p.894.)

Available in sizes having openings ranging from 48 in. to 12 ft., battery operated Model AN magnetizing units for magnaflux inspection have a maximum capacity of 5,000

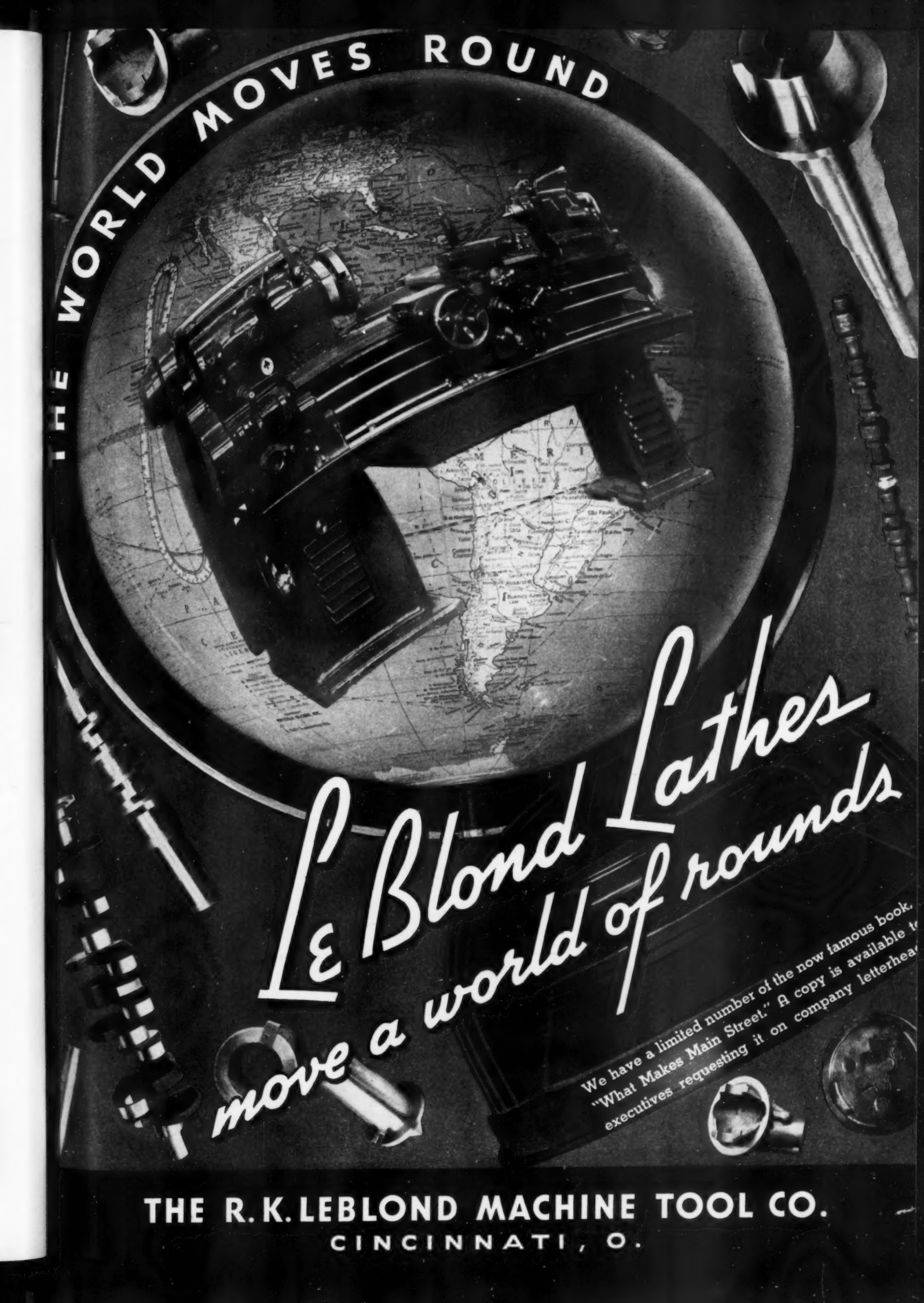


amp. This unit uses the wet method of inspection, which consists of flowing on the detection liquid after the part has been magnetized and may be accomplished while the part is under inspection.

Polarizer, Photo-Elastic

Bausch & Lomb Optical Co., Rochester, N. Y. (Vol.81,p.892.)

This photo-elastic polariscope is designed for use in the study of stress distributions and strain deformations. In practice, a transparent model of the object under test is made, using a synthetic resinous material. The model is placed in the photo-elastic apparatus and loaded with weights simulating loads encountered in operating conditions sustained by the full size part. Lens equipment is designed to insure a sharp image, free from distortion and color fringes. This instrument is shown dismantled to indicate the number of parts.


THE WORLD MOVES ROUND
L & Blond Lathes
move a world of rounds
We have a limited number of the now famous book,
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THE R. K. LEBLOND MACHINE TOOL CO.
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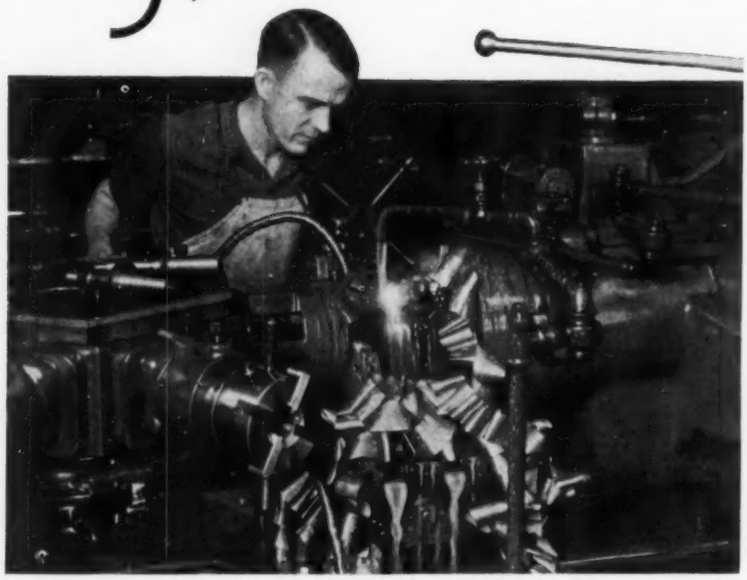
UNIVERSAL TURRET LATHES

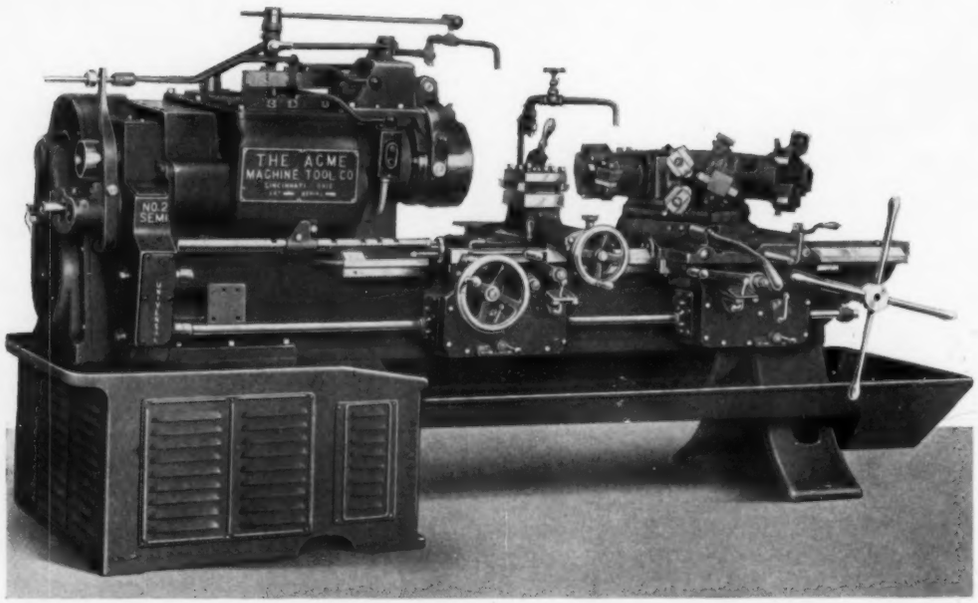


WILL FIT YOUR NEEDS

Because of their sturdy rugged construction they deliver an abundance of smooth flowing power to the cutting tools.

Back up your turret lathe operators with Acmes on your toughest jobs.

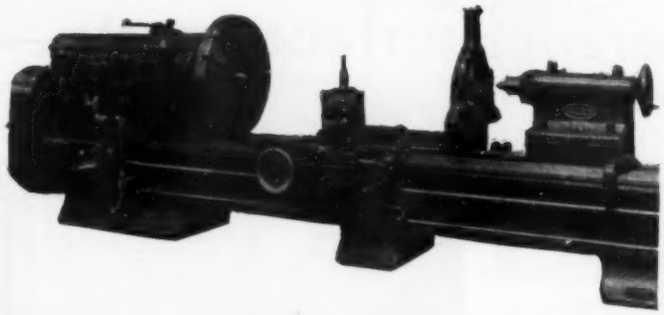
Our tool engineers are prepared to handle your production problems.



The **ACME MACHINE TOOL CO.**

CINCINNATI, OHIO

The New Niles Time Saver Lathes. Built in 27"-30" and 36" Sizes.

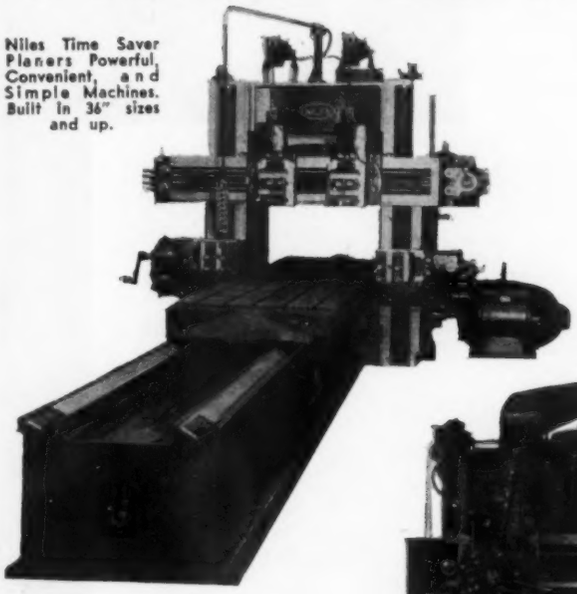


NILES

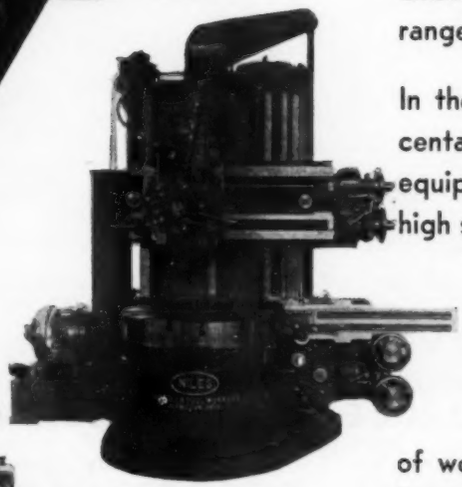
TIME SAVER TOOLS

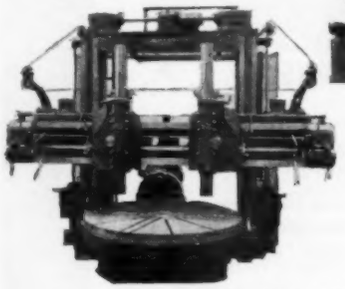
for Industry

Niles Time Saver Planers Powerful, Convenient, and Simple Machines. Built in 36" sizes and up.



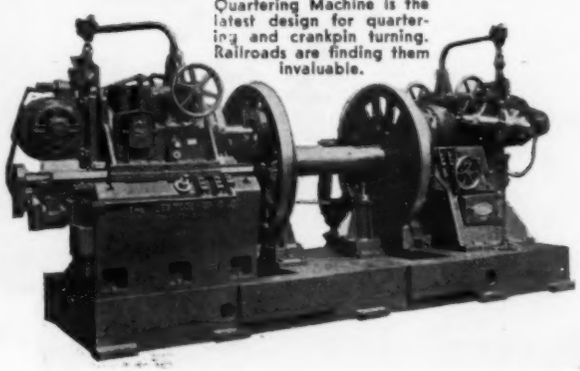
Niles Boring & Turning Mills need no introduction. Have been depended upon by industry for years. Built in practically all sizes.





The new design side head mill. A real Production tool. Built in two sizes. 36"-44" and 42"-50".

The Niles 90" Balanced Quartering Machine is the latest design for quartering and crankpin turning. Railroads are finding them invaluable.



• The purchase of any type of equipment in today's market is weighed carefully before a decision is reached. The machine must prove its earning capacity, its ability to stand up under heavy cuts, its adaptability to a wide range of operations.

In the Niles line you can cover a large percentage of your machine tools needs with equipment designed and built to stand the high speeds and feeds required. Rugged construction to produce accurately over long periods of time.

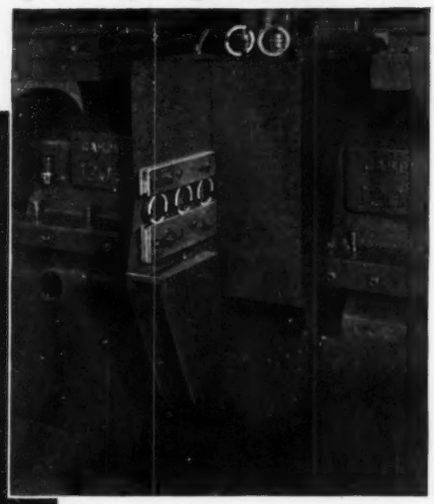
Niles offers lathes, planers, boring mills and special machines for specific types of work. Time Saver Tools that have records for economy, accuracy and low maintenance. Heavy duty tools for unusual operations on big jobs.

Consult Niles first—you'll find plenty of evidence of Niles ability in many of America's finest and largest plants.

GENERAL MACHINERY CORP.

NILES TOOL WORKS DIVISION
Hamilton, Ohio.

For DOZENS of parallel-surface parts—



GARDNER DOUBLE-SPINDLE DISC GRINDERS

FIG. 1. A simple "push-thru" fixture on a 20" Gardner Double-Spindle Grinder, by means of which flange clamping nuts are fed through the machine by hand in a constant stream.

The nuts are malleable iron; stock removal averages .030" over-all; the parts are held within .002" of flat, .004" of parallel, and .010" for uniformity.

PRODUCTION: 20 to 30 PER MINUTE.

FIG. 2. A Hand-Operated Swinging Attachment carrying a special clamping fixture, grinds these universal joint yokes. They are handled at the rate of from 200 to 250 per hour, removing .010" stock per surface, and are held within .001" of flat, .002" for parallelism and uniformity, and central and square with stem within .004".

This Swinging Attachment is exceptionally popular, being adapted to a great many jobs.

YOUR parallel-surface jobs can be GARDNER-GROUND by many different methods, as the accompanying illustrations indicate.

Special attachments and fixtures, applied to a standard machine base, give either moderate output, or high production, according to your requirements.

Investigate GARDNER DOUBLE-DISC GRINDING—
WRITE FOR BULLETIN 400!

GARDNER MACHINE CO., 410 East Gardner St., BELOIT, WIS., U. S. A.

FIG. 3. Parts which can be allowed to spin or "float" during grinding, are often ground in a "Gun-type" sliding fixture like that shown here.

These meat chopper plates are rough ground at the rate of 150 per hour, removing .010"-.020" over-all, and are held within .002" of flat and parallel, and within .005" for uniformity. They are made of soft steel.

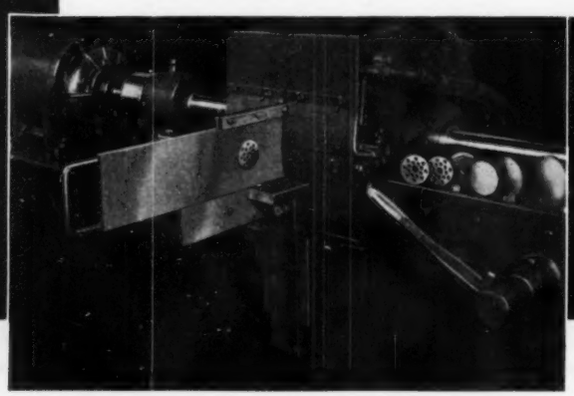
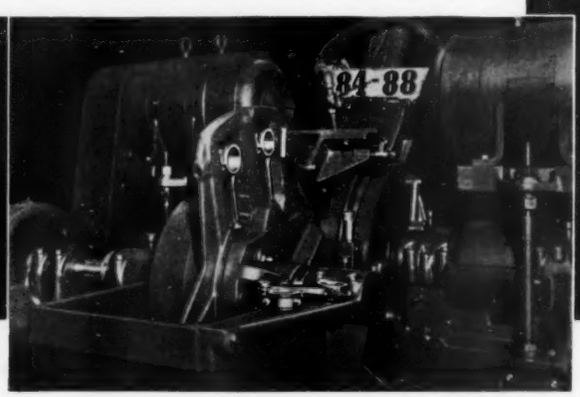


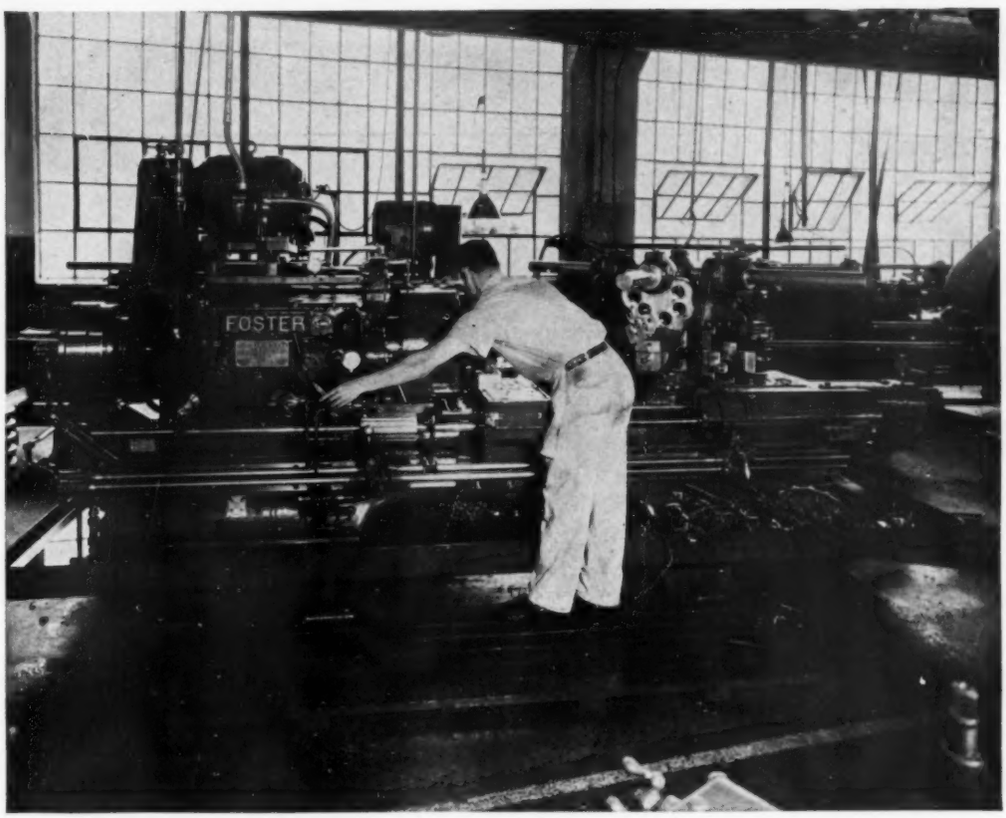
FIG. 4. Many high-production jobs are handled on rotary work carriers, which need only be loaded and unloaded by the operator.

The connecting rods shown here are ground on the crank end only, at the rate of 6 to 8 per minute, and are held within .002" for parallelism and uniformity.



The FOSTER FASTERMATIC

NOW IN THE SERVICE OF THE WRIGHT AERONAUTICAL CO.



Wright Aeronautical Co. Fastermatic installation—steel supercharger gear and steel Ring Gear for planetary reduction mechanism, being machined.

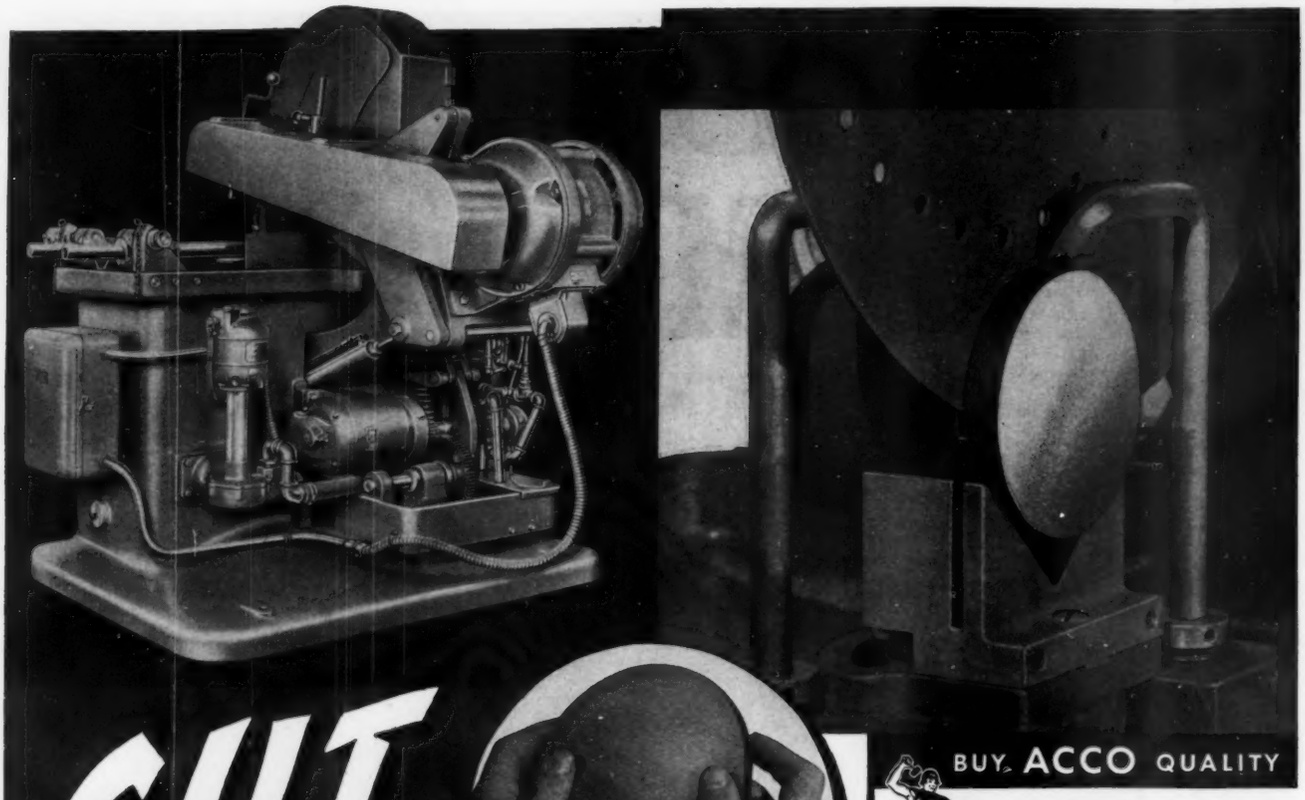
The Foster Fastermatic has an active part in the production of aeroplane parts. Its adoption by the Wright Aeronautical Co. adds new approval to the long list of Fastermatic users which includes a wide variety of manufacturers.

Where precision is the rule—where maintained speed is essential—where reduced operator fatigue is desired—where that combination of quality production and low cost operation is demanded—you can depend on Fastermatics.

No. 3F featured here is one of our latest types of Fastermatics. Typical of Fastermatic construction, it is simple in design, simple in operation, extremely accurate, entire feeding mechanism easily accessible, and is a faster producer.

Be sure you have all of the facts on the new Fastermatic improvements. Let us send you full details and specifications. If you have a particular problem let our engineers recommend the Fastermatic type exactly suited to your needs. Send blueprints of parts machined.

FOSTER MACHINE COMPANY, Elkhart, Ind.



CUT IN SECONDS INSTEAD of MINUTES —and FINISH AS YOU CUT . . .

● In a few seconds the Campbell Cutamatic does a cutting job in hard tough or stainless steels or other materials that would require minutes by any other method. Cuts steel up to 6 inches in diameter at the rate of a square inch every 7 seconds. Ordinary abrasive cutting machines, by the way, can cut rounds up to only 2 inches in diameter.

The Campbell Cutamatic smooths as it cuts—produces a surface that usually requires no later finishing operation. Does not burn or case harden the material or leave a heavy burr.

The Cutamatic assures longer wheel life because it maintains a shorter arc of contact during the cutting operation regardless of the area of the material being cut.

Write for your copy of a booklet describing the Campbell Cutamatic in detail.

ANDREW C. CAMPBELL DIVISION
AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT, CONNECTICUT
Designers and Builders of Special Machinery

BUY ACCO QUALITY

A FEW OF THE 137 AMERICAN CHAIN & CABLE INDUSTRIAL PRODUCTS

AMERICAN CHAIN DIVISION
(DOMINION CHAIN COMPANY, Ltd., in Canada)
Weed Tire Chains • Welded and Weldless Chain • Malleable Castings • Railroad Specialties

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Electric Steel Castings, Rough or Machined

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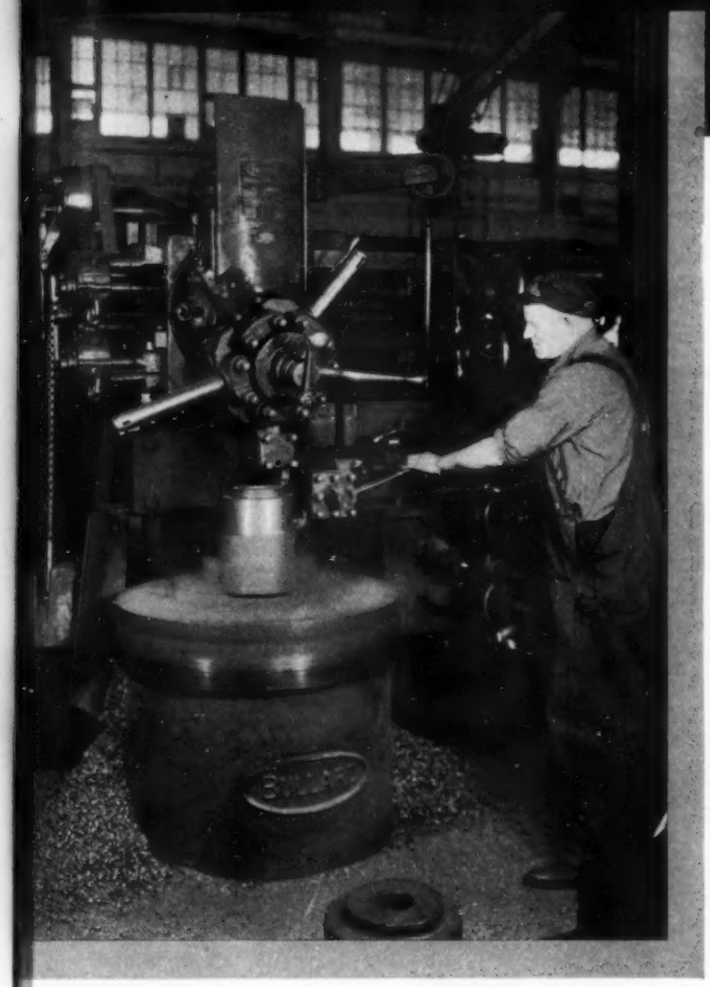
In Business for Your Safety

CAMPBELL *Material Cutting* **MACHINES**

OUT WITH THE OLD

Make place for the PROFIT MAKERS



The old machines may have been written off, BUT they don't and can't make Profits comparable to New Equipment.

Now, more than ever, business must rely on Profitable manufacturing equipment for the answer to many of the operating and financial problems.

VERTICAL TURRET LATHE

Certainly if Bullard Vertical Turret Lathes are doing Profitable work for many, they can do as much and maybe better for you.

At least it doesn't cost you anything to find out. Ask us about these machines in 24" - 36" - 42" - 54" and 64" sizes as applied to your work.

BULLARD

THE BULLARD COMPANY

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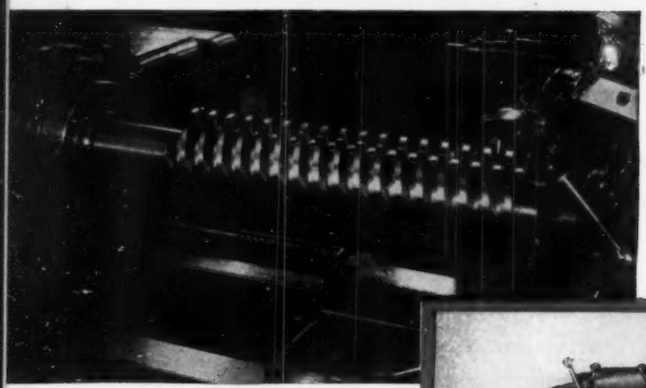
Pratt & Whitney is

FOR MACHINE

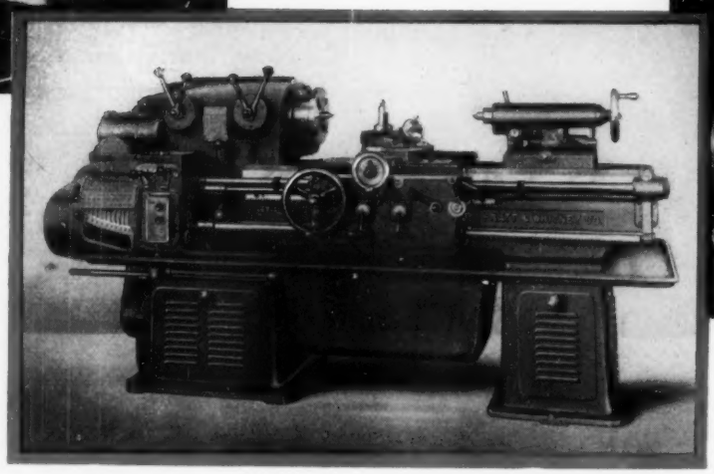
"There is no better paying investment than the right tools for the job."



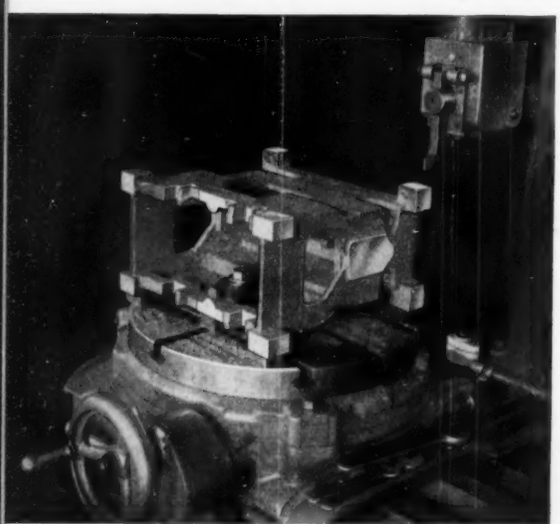
Above: Pratt & Whitney Thread Millers are available in three sizes, 4½", 6" and 10", and in varying lengths of bed. Complete information and literature are available.

• • •

Below: Pratt & Whitney Vertical Shapers are rightly called "the handiest machines in the shop". They are available in two sizes, 6" and 12". Ask for complete literature.



Above: Because of Pratt & Whitney developments in gear grinding it now is possible to produce accurate ground gears at a cost comparable with ordinary gears. Ground gears have many advantages that it will pay you to investigate. Ask for complete literature.



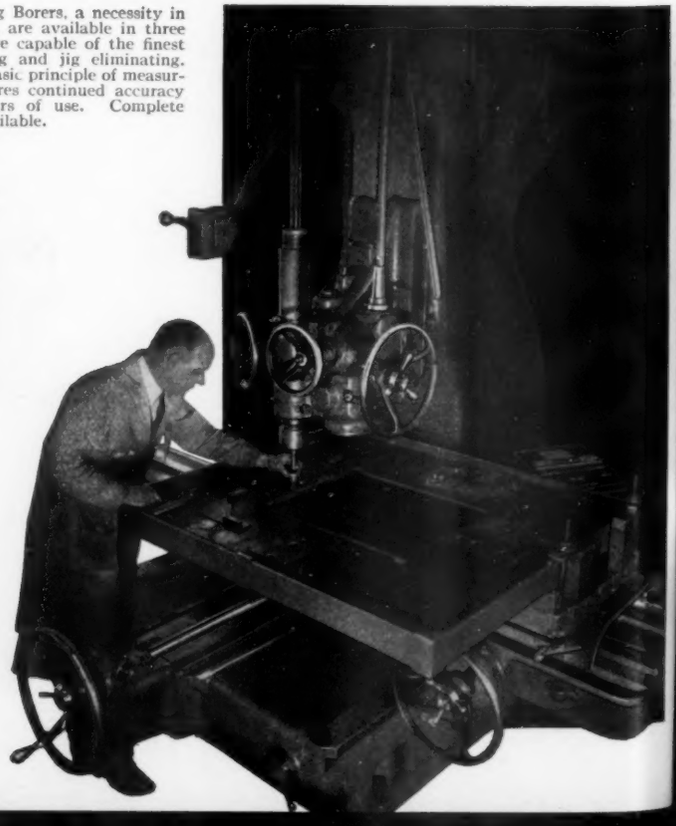
Above: Pratt & Whitney 12 inch Model "B" Lathes and 14 and 16-inch Model "C" Lathes, all with the Cam-Lock Spindle Nose, are the finest of accurate tool room equipment —the standard by which all fine lathes are judged. Complete literature is available.

• • •

Right: P&W Jig Borers, a necessity in any tool room, are available in three sizes. They are capable of the finest precision boring and jig eliminating. They use the basic principle of measuring which insures continued accuracy even after years of use. Complete literature is available.

• • •

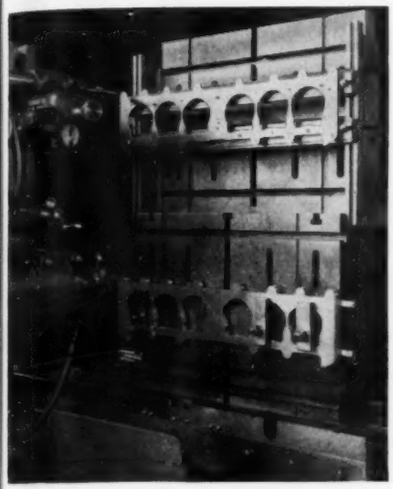
Left: P&W Hydraulic Vertical Surface Grinders are in wide use finishing all sorts of work. They are capable of fine accuracy at high table speeds. They are built with 8", 14", 22", 26" and 30" wheels. Ask for information.



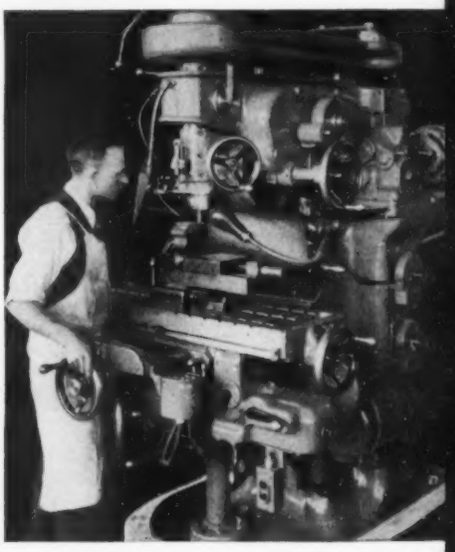
Accuracy Headquarters

TOOLS

The manufacture of machine tools, the basic tools of industry, involves a continuous devotion to accuracy. The care we use in every step is something that always amazes our visitors. It must be seen to be properly appreciated. Visit us at Hartford and let us show you first-hand what must go into a fine piece of equipment if it is to function properly and with accuracy.



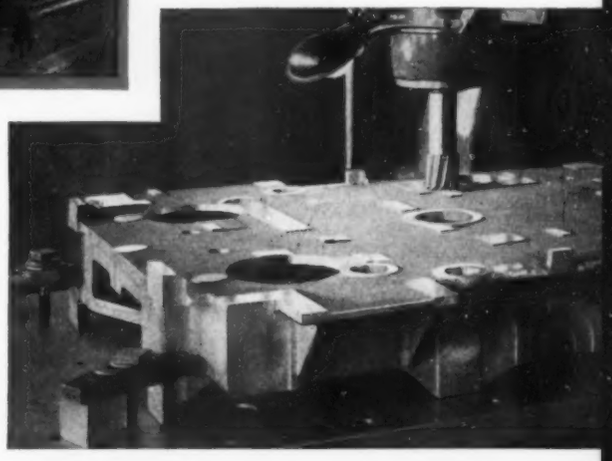
Above: The Keller Automatic Tool Room Machine reproduces automatically and accurately in tough metal the shape of a master made of wood, plaster, soft metal or any other easily worked material. This is the ideal way to produce dies and many other intricate shapes and cavities.



This is the P&W Universal Die Sinker that has reduced the cost of die cutting up to 75%. Every die shop should have complete literature.

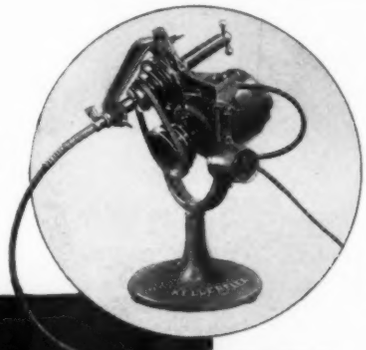
• • •

Above: This is one of the larger sizes of Keller machines cutting a typical automotive body die. Ask for information.

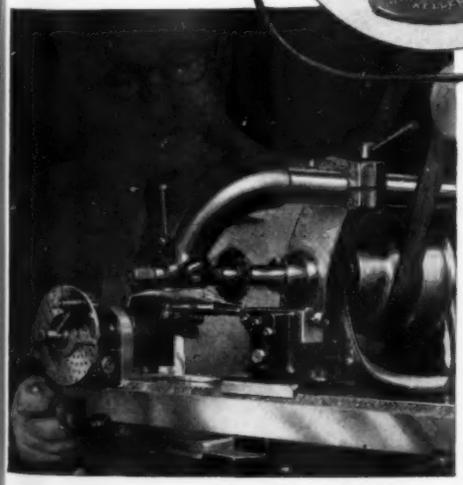


• • •

Right: Kellerflex means a complete line of flexible shaft machines for every purpose, and a complete line of accessories for them, all built with Pratt & Whitney precision.

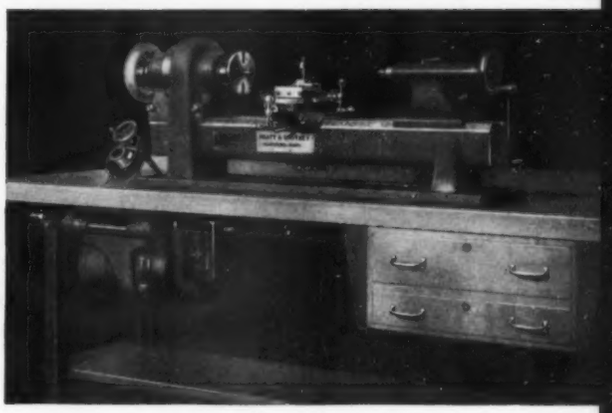


Right: P&W Profilers are well known and have solved many a difficult forming job. They are equally valuable for vertical milling as shown here. Literature is available.



• • •

P&W Bench Machine Tool Equipment is widely used for making small accurate parts. This equipment releases larger machines for more suitable work. At the left is the P&W No. 3 Universal Bench Miller, a duplicate except for size of the big machines, and capable of the finest precision. At the right is the new P&W 10" Bench Lathe driven by the New Departure Transitorq. Combinations of machines on suitable benches are available. It will pay you to investigate this modern equipment for your small work.



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DIVISION NILES-BEMENT-POND CO.

HARTFORD, CONNECTICUT

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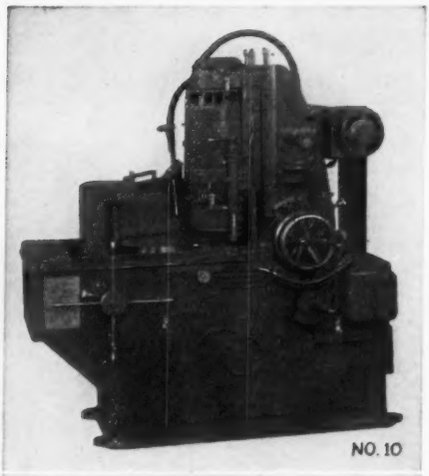
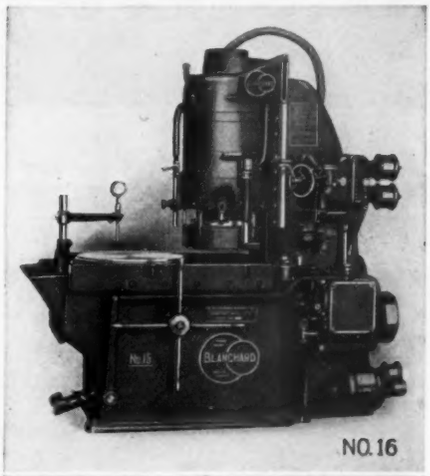


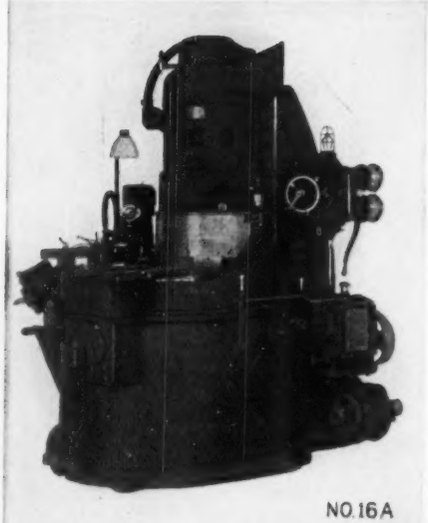
NO. 10

Flat Surfaces Are Best Machined by BLANCHARD GRINDING

Six machines cover a wide range of work. Magnetic chucks, magnetic fixtures, hand and automatic clamping fixtures, provide for holding all shapes of work, including non-magnetic materials. Our experience can be applied to your problems.



NO. 16



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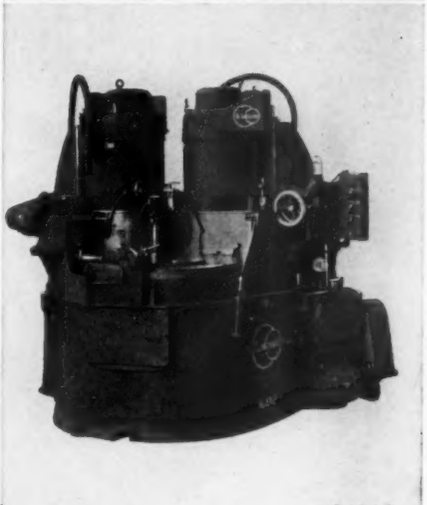

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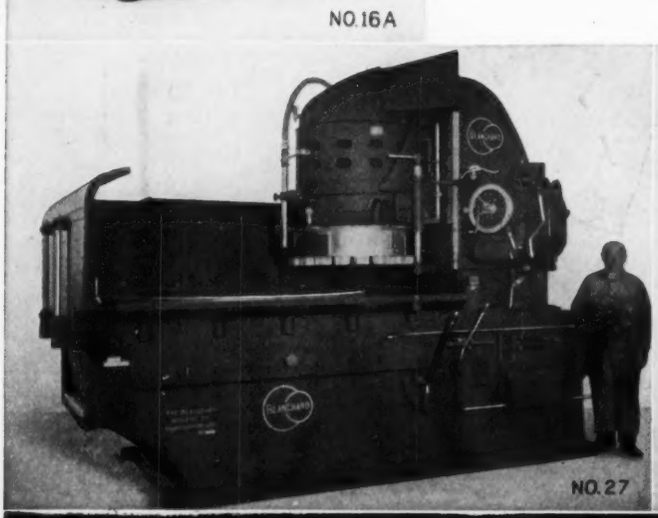

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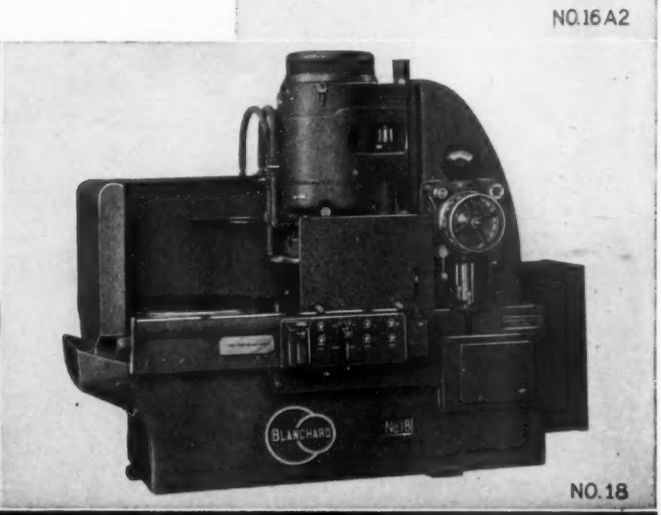


NO. 18

For information on these machines and their application to your work write to

BLANCHARD MACHINE COMPANY

64 State Street, Cambridge, Mass., U. S. A.

RED RING METHODS Satisfy Industry's DEMAND For BETTER GEARS

The quickest, the most economical and the most effective way of eliminating tooth profile errors in rough cut gears is by Red Ring method of crossed axis shaving (patented).

Red Ring shaving gives you tooth profiles accurate to a "tenth", and at the rate of one gear every 20 to 40 seconds.

In addition, Red Ring shaving makes every gear in a given lot uniform. It eliminates those small projections on the tooth surface that otherwise are so troublesome in producing "squeal" after the gears are put in service.

Of equal importance is the fact that you can shave gears in approximately 20% of the time it takes for a final light finishing cut on previous methods of finishing.

• • • •

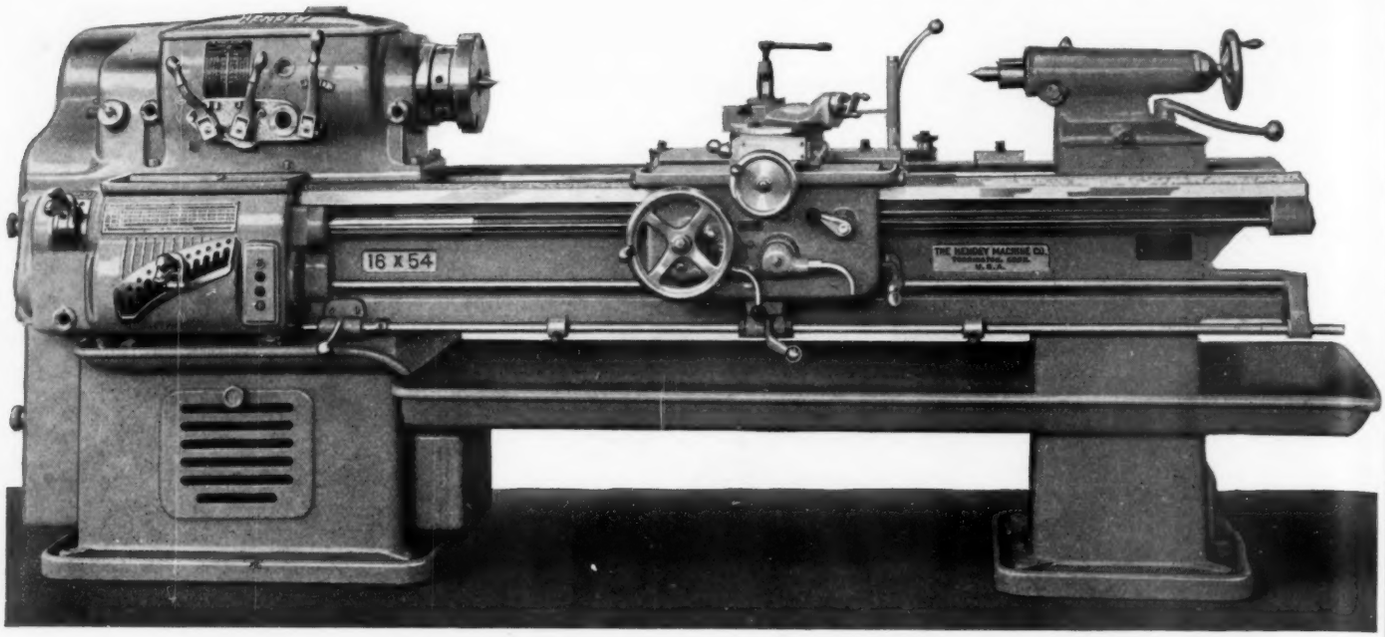
"Modern Methods Of Gear Manufacture", a comprehensive treatment of this subject is available to design and production executives.

Let

National Broach engineers interpret shaving in terms of your product and your production volume. Write for details.

NATIONAL BROACH & MACHINE COMPANY

SHOEMAKER & ST. JEAN DETROIT, MICHIGAN



18-speed Precision Engine Lathes

that come in 12″, 14″ and 16″ sizes. No matter the work, these lathes will take it on and deliver.

HENDEY

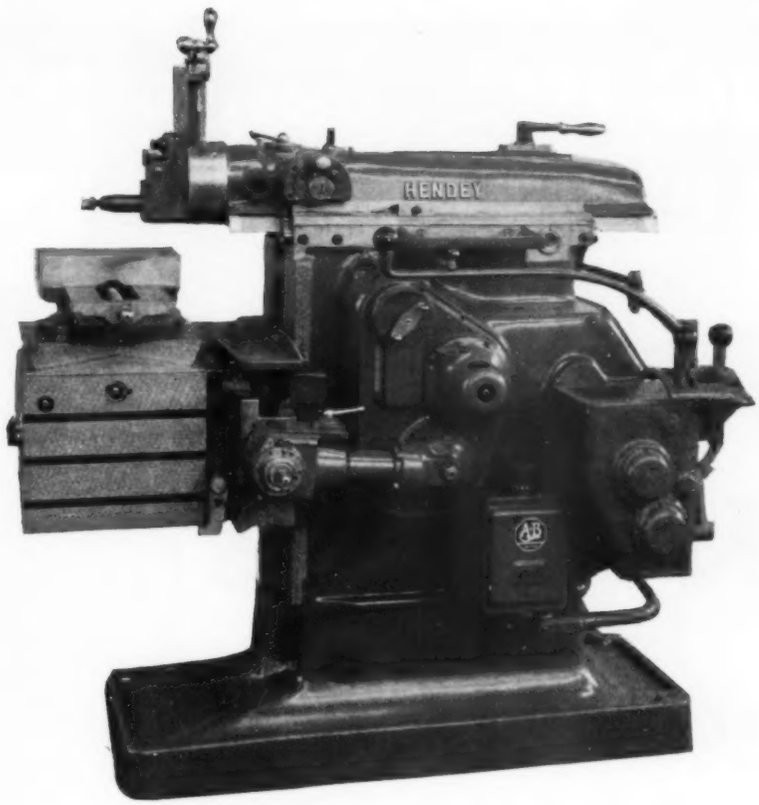
KNOWN AND USED BY MANUFACTURERS WHO MA

4C Manufacturing Lathe

Created for those who want production capacity with engine lathe adaptability. A lathe that will show something worth while to the man who demands proof.

The Hendey Machine Co.

Branch offices: 1033 Singer Building, NEW YORK • 565 Washington Boulevard, CHICAGO



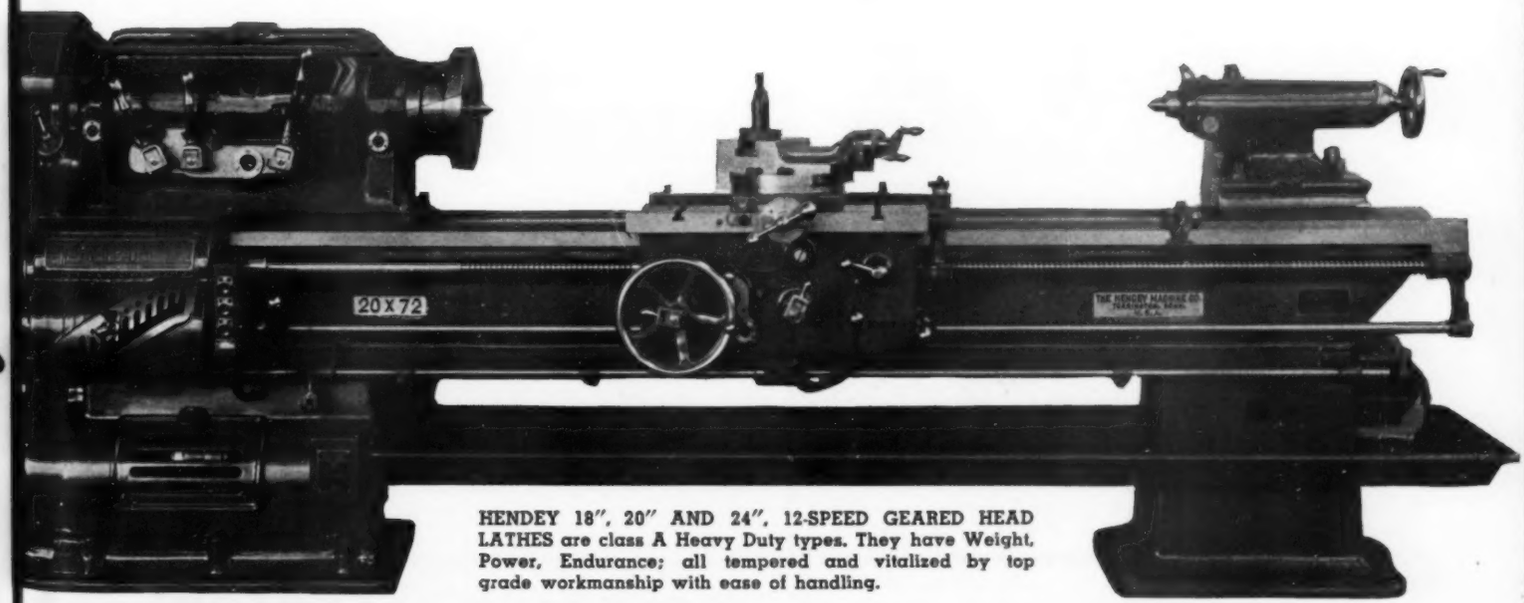
12-Inch High Speed **CRANK SHAPER**

Unexcelled in the field of small tool and die work. Used by nationally known manufacturers everywhere. A shaper that has made its way through sheer merit and gives added lustre to the Hendey reputation.

HENDEY Standard and Heavy Duty shapers come in 16", 20", 24" and 28" stroke.

TOOLS

MAKE IT THEIR BUSINESS TO SELECT THE BEST



HENDEY 18", 20" AND 24", 12-SPEED GEARED HEAD LATHES are class A Heavy Duty types. They have Weight, Power, Endurance; all tempered and vitalized by top grade workmanship with ease of handling.

Torrington, Conn., U. S. A.

521 Commerce Building, ROCHESTER • 66 Cherry Street, WEST NEWTON, MASS. • 1534 Dime Bank Building, DETROIT

NEW PRECISION
NEW LOW COST
per piece

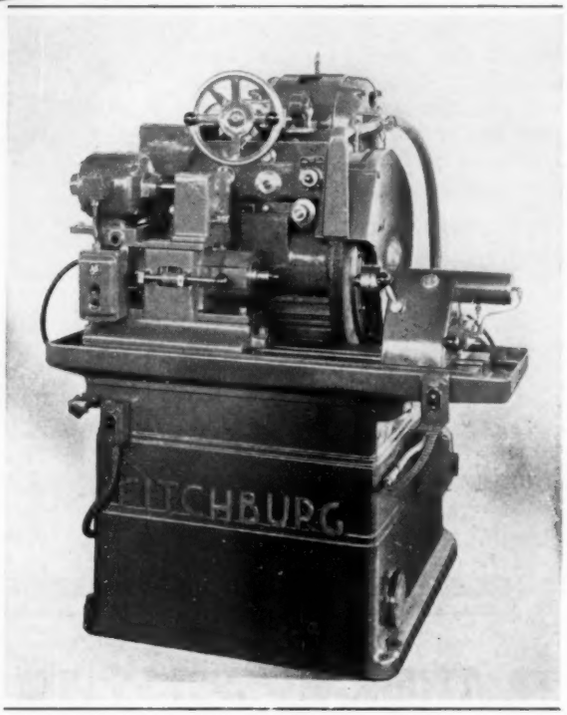
New!

FITCHBURG

6 x 12 in. PLUNGE CUT

PLAIN CYLINDRICAL

GRINDER



Headstocks can be furnished for either live or dead spindle operation and the complete cycle can be interlocked for operation from one lever. A retractable headstock center with a solid foodstock can be provided. Grinding wheel is carried on the right-hand side of the spindle, instead of the conventional left side, resulting in a saving of floor space. Machine can be furnished in a chucking grinder model. The workhead can be swiveled for taper work.

Specifications: maximum swing over table, 14 in.; maximum length between centers, 12 in.; height from floor to centers, 42 in.; number of work speeds, infinite from 50 to 350 r.p.m.; diameter of headstock spindle, 2 in.; diameter of footstock spindle, 2 in.; diameter of grinding wheel spindle, 3 in.; maximum feed of "Bowgage" wheelhead on diameter, 0.125 in.; rapid traverse of wheelhead, set at factory, from 0 to 5 in.; range of grinding feed rates, infinite; dwell or spark-out time, 0 to 35 sec.; floor space required, 38 in. wide by 48 in. deep; net weight, 4,800 lb.

Wheel feed of the "Bowgage" head is obtained by a toggle action controlled by the movement of a leaf spring. Hydraulic flattening of the leaf spring by a vertical movement elongates the spring; this results in forward movement of the wheelhead. Rate of grinding feed is adjusted by a hydraulic valve through a dial on the panel. Dwell time is governed by clock-control time-delay switch. Another graduated dial, operated by a small handwheel, controls the amount of stock removal.

—with the

"BOWGAGE" HEAD

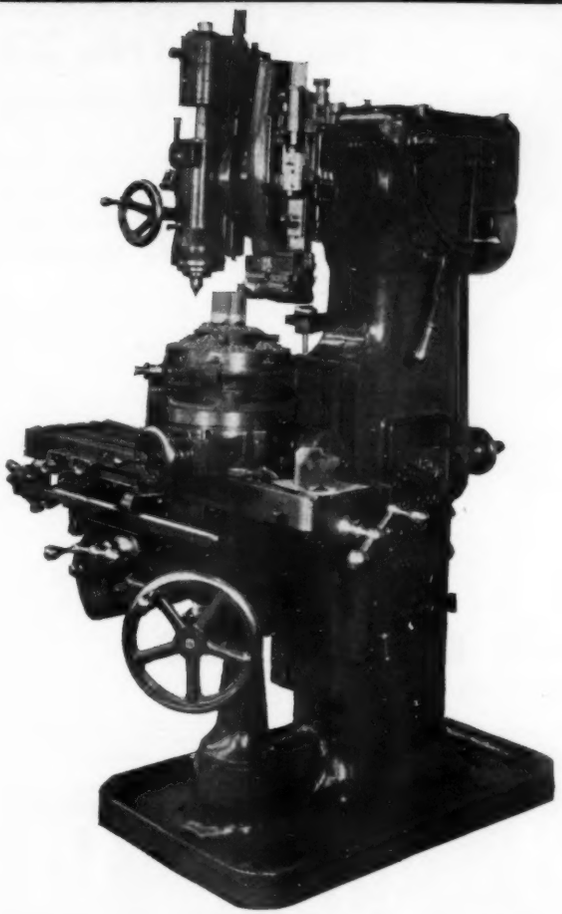
The Bowgage Head represents a new method in grinding. It is a self contained unit for automatic grinding wheel feed. Can be applied to any plain grinder.

Fitchburg

GRINDING MACHINE CORPORATION

FITCHBURG . . . MASS.

More Work · · Better Work · · Less Cost



DUPLEX UNIVERSAL VERTICAL MILLER AND SHAPER

Universal adjustments adapt this machine to a wide range of operations on Dies, Jigs, Box Tools, Metal Patterns, Molds, etc. Drilling, Boring, Milling and Slotting can be performed at infinite angles at one setting of the work, saving set-up time and eliminating chance of error. Longitudinal Feed (automatic) 18½"; Transverse Feed (automatic) 9"; Vertical Adjustment 18". Milling Speeds 55 to 2100 r.p.m. Shaper Ram stroke 0 to 6".

Also Manufacturers of
Universal Vertical Milling Machines
Universal Vertical Shapers
Circular Tables
Cutting-Off Machines
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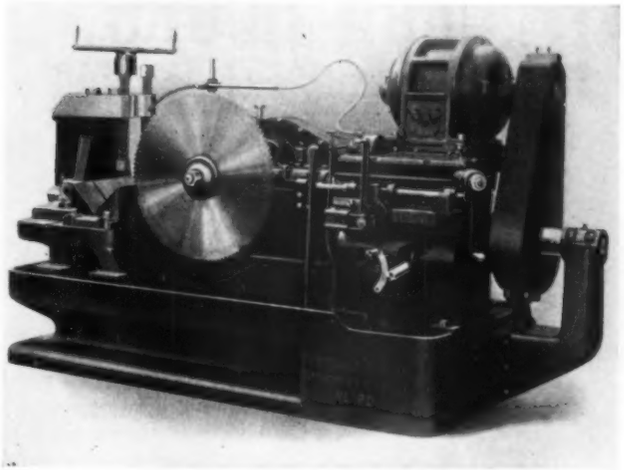
The
COCHRANE-BLY LINE

Modern equipment is needed today to meet competition and make a profit. That is why Cochrane-Bly machines have won the acceptance and plaudits of production executives in many plants. Precision—flexibility—and ability to stand up under the most severe production schedules are dominant characteristics.



METAL SAWING MACHINE

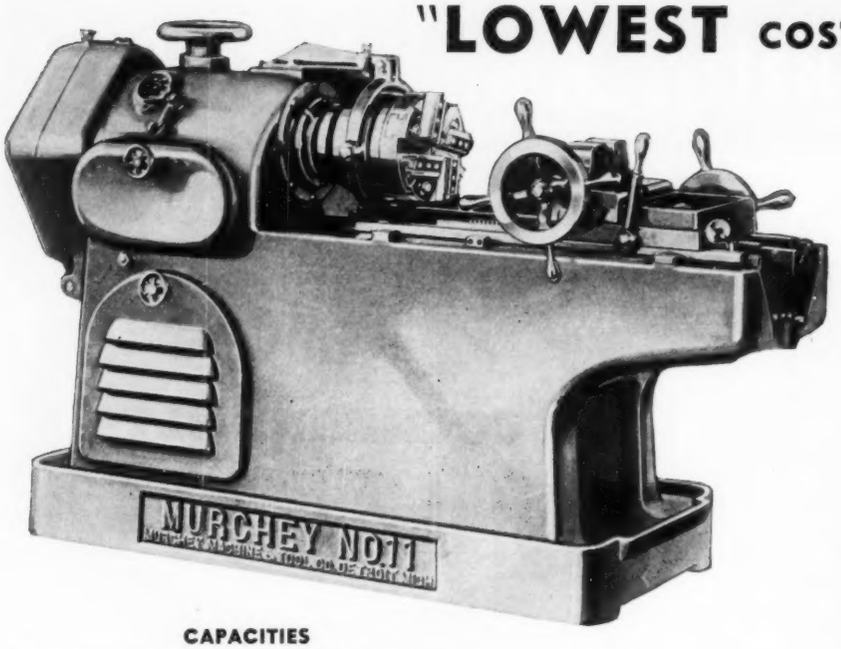
Heavy design and exceptional construction assure low cost high production. Drive is through a powerful friction clutch and hardened steel gears. May be used for cutting a single bar or a bundle of round bars in one operation. No. 66 Machine illustrated will cut Round Bars up to 10" dia., Square Bars 9" sq.; I-Beams of 12 in. and Rectangular Sections as large as 8 x 12. Other sizes are available to handle work of smaller sizes.

COCHRANE-BLY CO., ROCHESTER, NEW YORK

"LOWEST COST PER THREAD"

with

MURCHEY
No. 11 and No. 22
THREADING MACHINES



Get higher speeds, greater accuracy and uniformity of work, more economical operation with Murchey Threading Machines.

- Tangential Chasers designed to produce the greatest number of grinds per set with the highest degree of accuracy are standard.
- Receding Die Heads are used to thread pipe.
- Heavy forged steel spindle operates on Timken pre-loaded roller bearings.
- Enclosed motors—push button controlled.

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Get Special Bulletin No. A. M.

CAPACITIES

No. 11 from ¼" to 1½" machine threads; ⅛" to 1¼" pipe threads; made in single or double head types. No. 22 from ½" to 2½" machine threads; ½" to 2" pipe threads; made in single or double head types.

THE MURCHEY MACHINE & TOOL CO.
DETROIT . . . . . MICHIGAN

Murchey also manufacture a full line of Collapsible Taps, Self Opening Die Heads, Double End Reaming, Chamfering and Drilling Machines; and Pipe Cutting Off Machines.

MAN HOURS

THE EASIEST WASTED RAW MATERIAL

Wasted man hours keep profit down, and make wage increases more burdensome. They are easy to waste—must be closely watched. Once gone, they have no salvage or scrap value.

Kent-Owens Millers reduce man hour wastes. Operators can produce more—earn more wages for themselves—more profit for the manufacturer. In hundreds of plants, their ease of set-up—speed—ease of handling—precision—and reliability are saving man hours.

Write for literature—these Millers are a paying investment.

KENT-OWENS MACHINE CO.
958 Wall Street **Toledo, Ohio**

P&J FOR OVER 35 YEARS P&J
THE PIONEER MANUFACTURER OF
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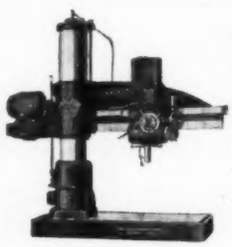
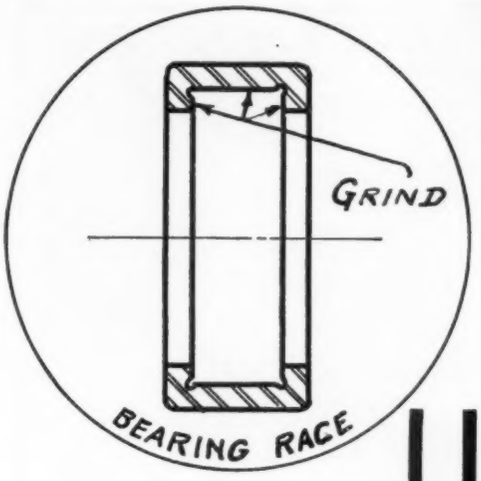
POTTER & JOHNSTON MACHINE CO.
PAWTUCKET, R. I., U. S. A.

Seventeen Years' Satisfaction

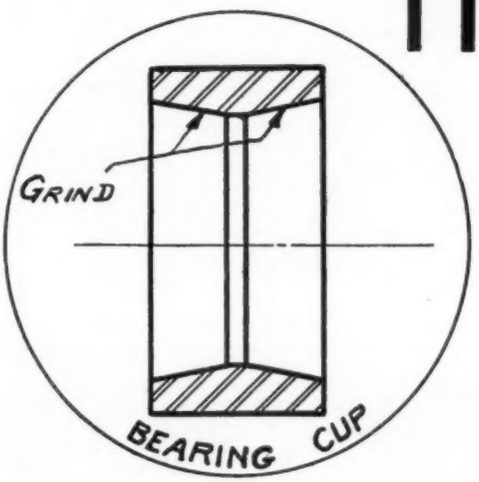


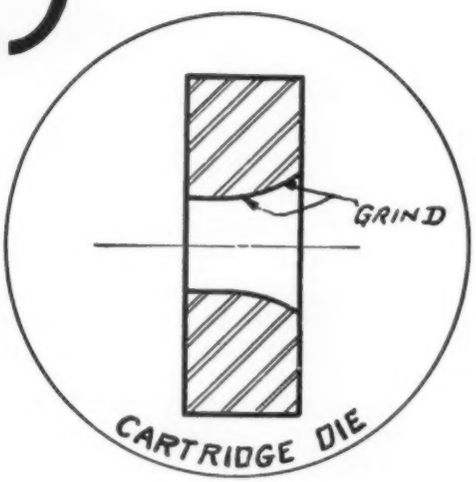
The Carlton All Ball Bearing Radial Drill pleases its users. Has done so for SEVENTEEN YEARS and will continue to do so. Learn all its features and you'll see why.

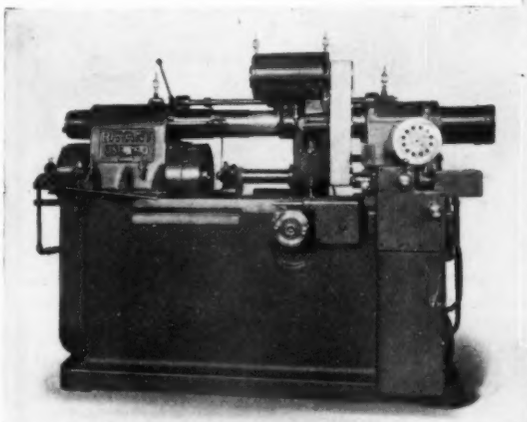
The Carlton Machine Tool Co.
Cincinnati, Ohio, U. S. A.



All Types HOLES *All Sizes*



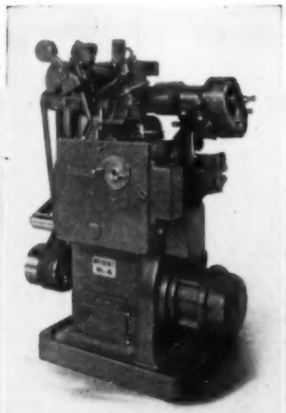




No. 16 Bryant Grinder

For Medium Size Work

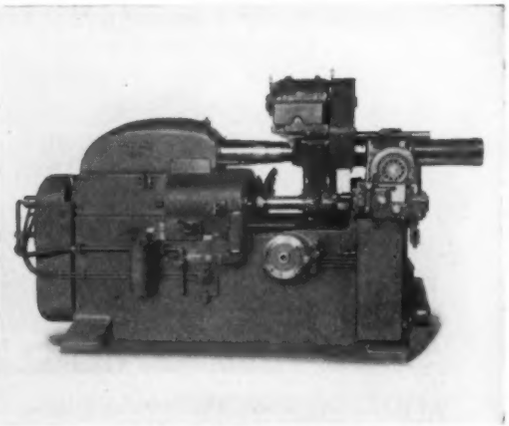
Furnished in three sizes: 16–16″ swing, 16–28″ swing, 16–38″ swing. Also two spindles for hole and face grinding, No. 16-A.



No. 4 Bryant Grinder

For Small Work

No. 4 with automatic sizing. No. 5 without automatic sizing. No. 5-B with adjustable work head for grinding steep tapers. No. 5-A with two spindles for hole and face grinding.



No. 24 Bryant Deep Hole Grinder

For Large Heavy Work

Furnished in two sizes: No. 24–21″ swing, No. 24–31″ swing.

BRYANT CHUCKING GRINDER CO.

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for Industrial and Railroad Shops

STATIONARY KEYWAY CUTTER AND SLOTTING MACHINES
18" to 72" stroke—Bulletin 26C

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SPECIAL HIGH DUTY DRAW-CUT RAILROAD SHAPERS
38" to 60" stroke. This machine will circular slot locomotive driving boxes and can be equipped with Shell Planing, Shoe and Wedge, Rod Brass and Crosshead Attachments, also Turret Type Head, making it the greatest Machine Tool offered for locomotive building and maintenance—Bulletin 25C.

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Bulletins showing Morton Draw-Cut Machine Tools will be gladly forwarded upon request.

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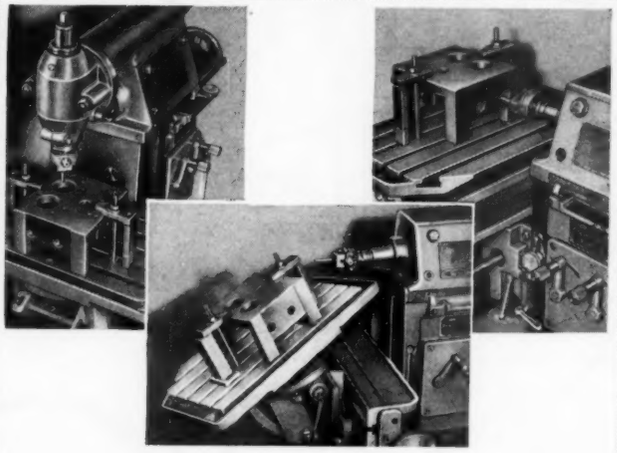

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AVOIDS MULTIPLE SETUPS

The DECKEL FP-1 mills, bores, counterbores, drills and slots at any angle in one setup . . . cuts production costs.

Drilling and boring a box jig horizontally and vertically without resetting, as shown above, is a simple operation on the DECKEL UNIVERSAL TOOL ROOM MILLER. Full Swiveling Work Table tilts in all directions. Can be quickly detached and replaced by a dividing head. Work table feeds powered horizontally and vertically, with single lever control. Special device for milling punches to close dimensions. Many other valuable features.

Investigate now—send for DECKEL FP-1 booklet.

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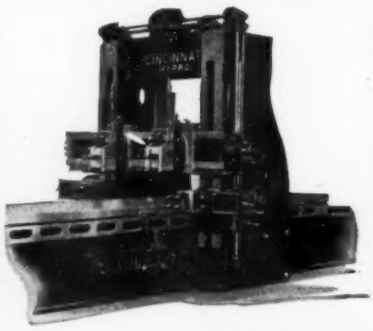

Planers
Double Housing Openside
Crank Planers
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Vertical Boring Mills

THE CINCINNATI PLANER CO.
CINCINNATI, OHIO

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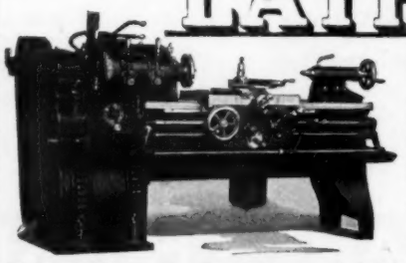


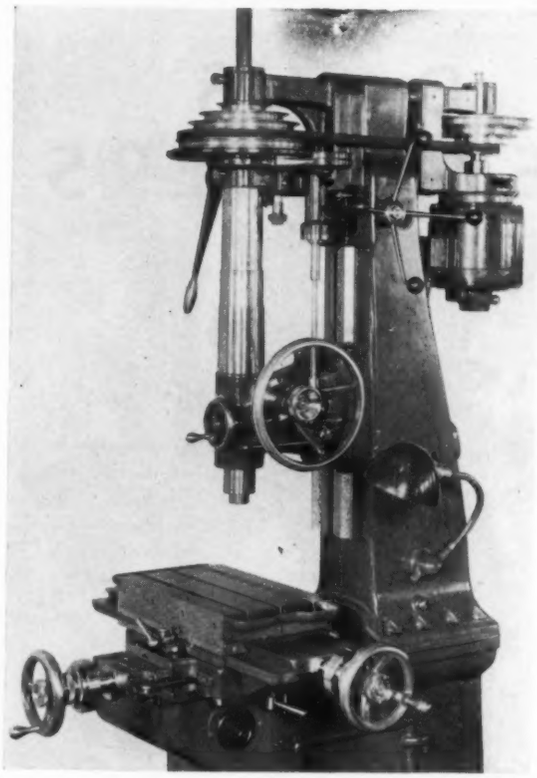
For Heavy Production Jobs or Fine Precision Work.

Versatile, simple to operate, ample power, rigid and accurate. Forty years making lathes—and lathes only—has enabled us to provide you with one of the finest lathes available—and at a surprisingly low cost.

SIZES 14 to 36"
Send for bulletin No. 25

THE BOYE & EMMES MACHINE TOOL CO.
CINCINNATI, OHIO

Could you finish 15 HOLES in 15 MINUTES?



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Each 3/32" in size, located, spotted, drilled and reamed:—**½" apart within .0002"?**

The Universal MOORE Precision JIG BORER does it!

It is the New Machine-Tool every toolroom can afford because the MOORE will produce More Jig Borer Work for your dollar, time and labor!

Ideal for rapid locating, drilling and boring jobs, or production work.

10 Spindle Speeds, with two-speed motor, from 100 RPM up to 2600 RPM.

Capacity from 1/32" up to 4" in mild steel.

Direct Dial Vernier reading .0001".

Accuracy of screws .00005" in one inch, .00015" in ten inches.

20 time-saving tools and accessories embodying latest tool developments.—Up- and down Power Feed—Silent gearless Drive—Quick acting spindle Brake—Fast-Stop-Slow Speed Combination Switch.

Write for complete catalog, or better yet ask for demonstration or visit our factory.

MARBURG BROTHERS, INC.

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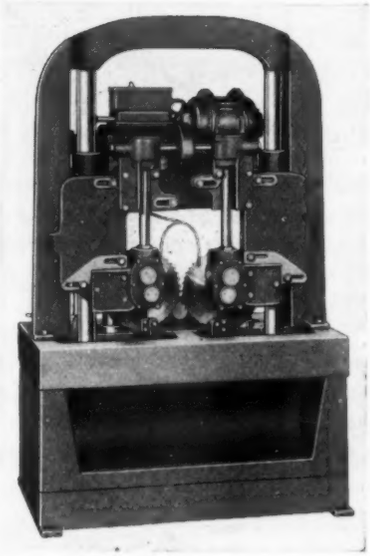
A New Step Forward in HIGH SPEED PRODUCTION SAWING



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Duplex Rotary Cut-Off Saw

- Cuts present sawing costs 50%.
- 2 cutting edges work in material at all times, reducing production time one-half.
- Thinner blades reduce material waste cost.
- Smaller blades cut replacement cost.

Write for complete information.

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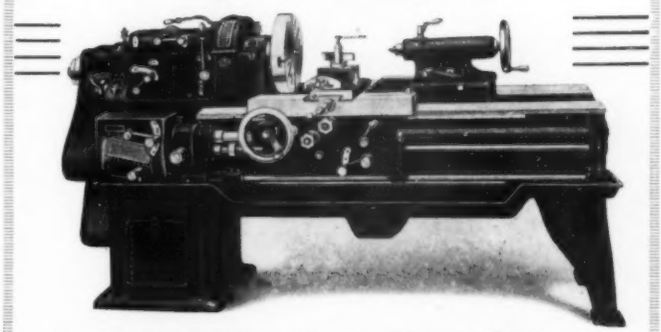
WELLS MFG. CORP. Three Rivers, Michigan

Famed for Accuracy also Most Output



Geared Head, Motor Driven, high production or tool room; guaranteed accuracy within .001" also many exclusive time saving conveniences. Sizes: 14", 16", 18", 20", 22", 24", 27" and 30", three different drives. Up to 24 speeds; 32 to 96 feed and thread changes controlled by two levers; will cut any standard, odd, metric, right or left-hand thread. Valuable features for supreme accuracy illustrated and described in latest catalog.

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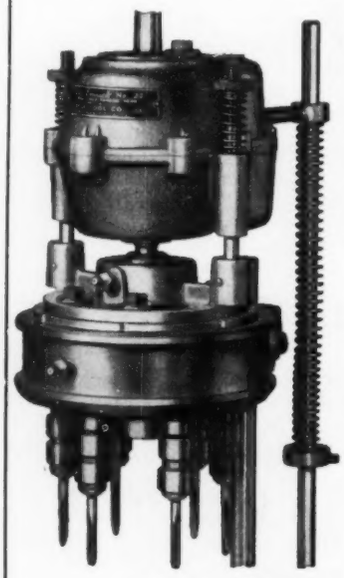
You're tapping with the "brakes on" until you've used an

Ettco-Emrick

Put Ettco-Emrick to work on light tapping and you'll save its first cost over and over again—even on short runs.

Investigate the Ettco-Emrick way and you'll never be satisfied with old-fashioned, slow, laborious high cost methods.



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Full details on any or all of these machines available on request.

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Multiple-Spindle Tapping Heads ☐ Tapping Attachment ☐
Gravity Feed Tapping Machine ☐ for trial ☐

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Illustration shows typical set up for cutting taper keyways with table tilted.

Tie with Today's Movement TOWARD MODERNIZATION

The cutter is set up in vertical position and remains vertical during the entire cutting process. The resistance arm back of cutter is adjustable to accommodate cutters of different widths or depths, and work of various heights.

The feed is table type, operated by hand lever in connection with pinion, meshing with rack attached to table. A graduated collar on feed shaft indicates depth of cut.

For cutting taper keyways the table may be inclined in either direction from horizontal, and a scale is provided to indicate the exact taper per foot for which it is set.

This is a very important improvement over our older machines in which the table was stationary.

The table is slidably mounted on accurately machined ways with a gib to take up wear.

Machines are made in three sizes for keyways 1/16" to 1½" in width.

Write us for new descriptive bulletins and detailed Specifications.

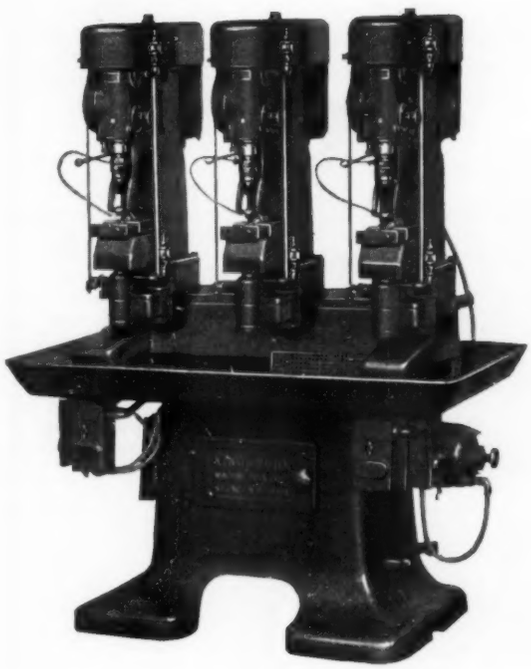
DAVIS KEYSEATER COMPANY

403 Exchange St., Rochester, N. Y.

KINGSBURY MACHINES

for

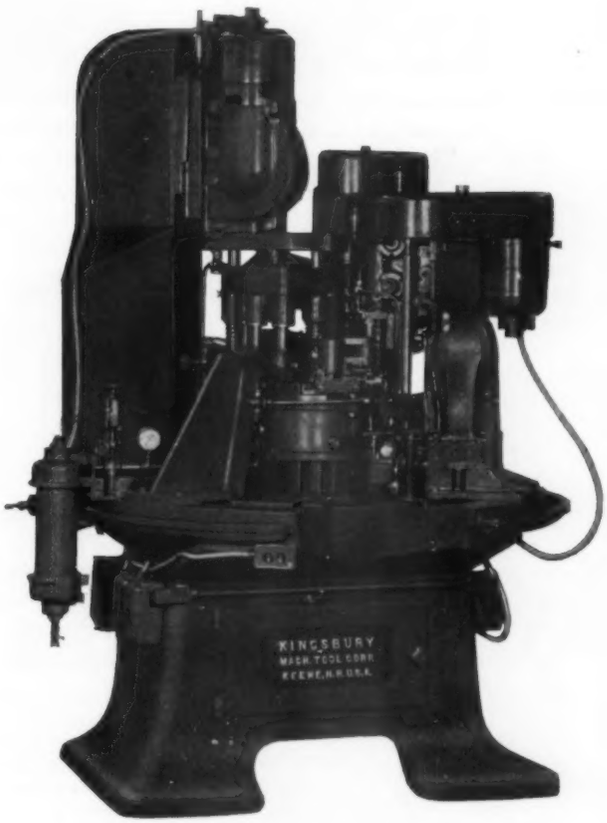
CROSS DRILLING AND COUNTERSINKING PINS



We are prepared to furnish a variety of styles and types of semi- and full automatic machines for cross drilling pins, bolts, etc. These machines are assembled from standard units in a manner which will best meet our customer's particular production requirements.

The top illustration is a very popular type of machine for comparatively short runs. It can be furnished with from one to four spindles each with automatic adjustable type clamping fixture and each, if desired, with underneath spindle for automatically countersinking the bottom of the hole to remove the burr.

The bottom illustration is an automatic indexing type machine for cross drilling and double countersinking the holes two pieces per cycle. The work is automatically unclamped and ejected. The operating rate is 3000 pieces per hour. This type of machine can also be furnished for handling one piece per cycle. The number of spindles can be varied to suit customers particular production requirements.



Our catalog "C" will give you an idea of the large variety of work which is handled on Kingsbury machines.

AUTOMATIC DRILLING *by the* KINGSBURY METHOD

KINGSBURY MACHINE TOOL CORP.
KEENE, NEW HAMPSHIRE
Originators of the Automatic Drill Head Unit

SEBASTIAN GOLD SEAL

PRECISION LATHE

Significant accuracy, held by the liberal use of Timken Roller Bearings in the 8-speed geared head, where snugness means precision in the work! Fine feeds, wide range of threads, rigid, flexible, sensitive, economical in use.

No finer toolroom lathe has ever been marketed at anywhere near the price. Sizes: 12", 14", 16", 18", 20" swing.

Now—a chromium hardened thread and spline on the lead-screw—one of the most significant advances in lathe *design* since lathes were first designed. Increases life of accuracy tremendously.

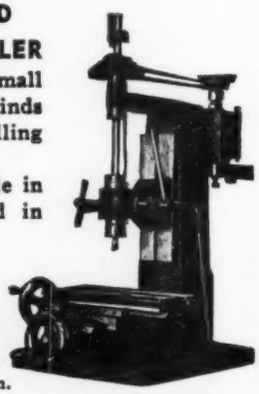
Cut shows 14" x 16" Gold Seal Lathe.

LINLEY HIGH SPEED VERTICAL BENCH MILLER

An ideal machine for all small die, jig and tool work of all kinds on laying out, milling, drilling and boring operations.

Substantial savings are made in its simplicity and speed and in releasing heavier machines for larger work.

Table Dimensions
5½" x 14½"



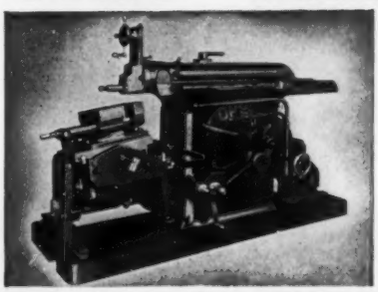
LINLEY BROS. CO.
581 Fairfield Ave., Bridgeport, Conn.

SMITH & MILLS
CRANK SHAPERS
sizes 12" to 32" stroke

THE SMITH & MILLS CO. Cincinnati, Ohio

GOSS and DE LEEUW
MULTIPLE SPINDLE
CHUCKING MACHINES
Two, Four, Five Spindles • Work and Tool Rotating Types
GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

"OHIO" SHAPERS



Universal table type illustrated. All types are manufactured complete with the most modern features. Send for Bulletin No. 57.

Manufacturers of Shapers, Planers, Horizontal Boring Mills.

THE OHIO MACHINE TOOL CO.
KENTON, OHIO

17 STYLES AND SIZES
MERRELL
for BETTER threads
PIPE THREADING MACHINES
TOLEDO, OHIO

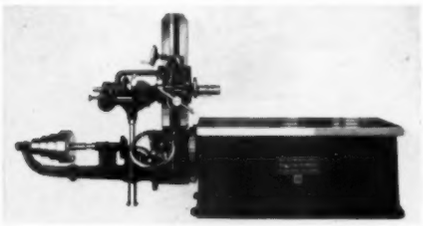
• RADIAL DRILLS •
HORIZONTAL BORING,
DRILLING & MILLING MACHINES
THE DRESES MACHINE TOOL CO., CINCINNATI, OHIO

BARNES PRODUCTION MACHINERY

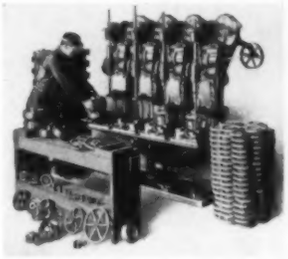
Through The Years 1900 to 1938

1900 to 1920 — Founded in 1872, the W. F. and John Barnes Company quickly established a secure position among the leaders and pioneers in the machine tool industry. The three early model Barnes machines shown were universally popular in the carbon steel age.

Above—Early model Barnes Drill Press, used throughout the world.

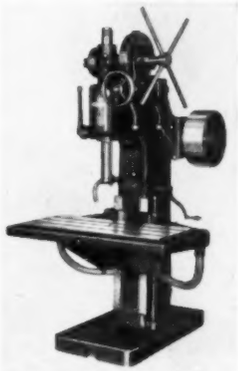


Left — Early Barnes Horizontal Radial Drilling, Boring and Tapping Machine, with swinging arm. Some of these are still in use!



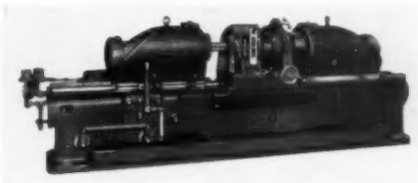
Above — Early model Barnes 4-spindle Gang Drill with automatic feed.

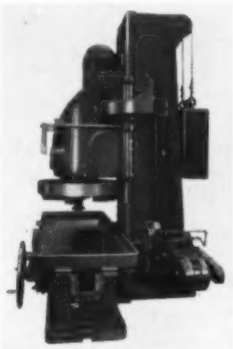
1920 to 1930 — A decade of development in Barnes high-production machines; the use of high-speed steel, Stellite, and hydraulic feeds.



Above — Barnes High-Speed General Purpose Production Drilling Machine.

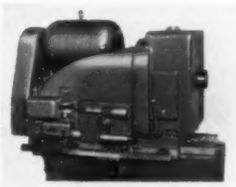
Right — One of the first Barnes special Horizontal Duplex Boring Machines with hydraulic feed.



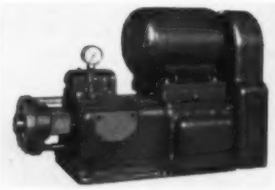


Above — One of our first special Vertical Boring and Milling Machines, with hydraulic feed.

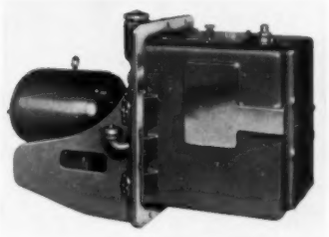
1930 to 1938 — The cemented carbide era; the perfection, and exclusive manufacture of our Barnes patented Hydraulic Pumps, Controls, and Hydraulic Units used in a wide variety of our machines.



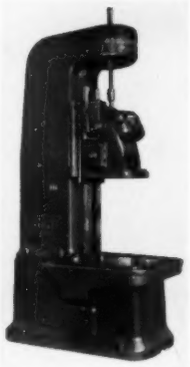
Above — Sliding Head Unit with Barnes Hydraulic Feed and Control.



Above — Barnes Hydraulic Square Ram Unit for boring, drilling, milling, etc. Self-contained. Made in three sizes, SR-2 shown.

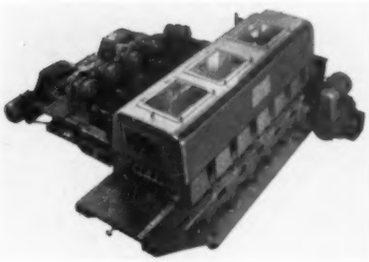


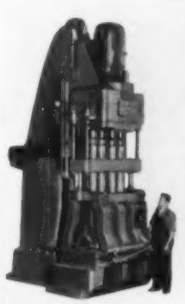
Left — Barnes "FT" Hydraulic Feed Unit, for mounting inside of column.



Left — Barnes No. 912 Standard Hydraulic Vertical Boring and Drilling Machine. Three types of Sliding Heads available, for single- or multiple-spindle work.

Right — Special Progress Through-type Machine with four Barnes Hydraulic Sliding Heads and one vertical Hydraulic Head for machining V-8 cylinder blocks. Has Barnes Hydraulic Indexing Unit for automatic indexing of work-pieces.





Above — No. 928 Heavy Duty Vertical Boring Machine with Barnes "FT" Hydraulic Unit. Shown equipped for tractor cylinder blocks.

ESTABLISHED 1872

W. F. & John BARNES Company

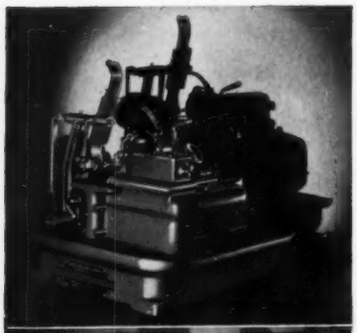
CONVERTIBLE HYDRAULIC MACHINE TOOLS

ROCKFORD, ILLINOIS, U.S.A.

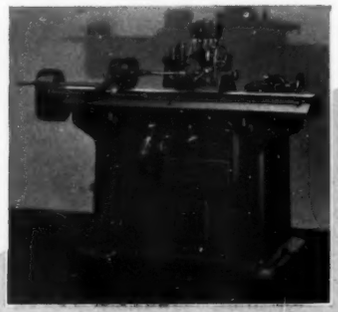
ACCURATE, POWERFUL, ECONOMICAL BORING and DRILLING MACHINES

MADE IN ROCKFORD, ILLINOIS, U. S. A.

For *Greater* PRODUCTION ACHIEVEMENT

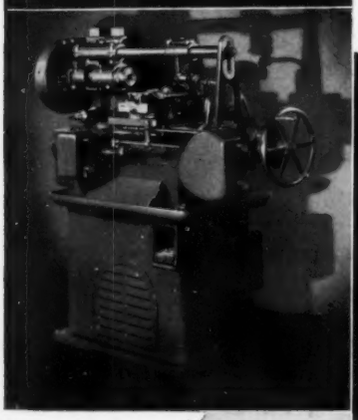


Type S
Hobbing Machine

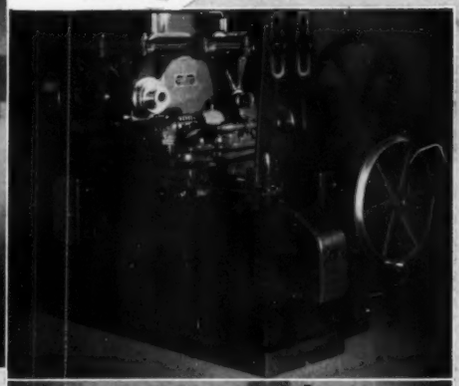


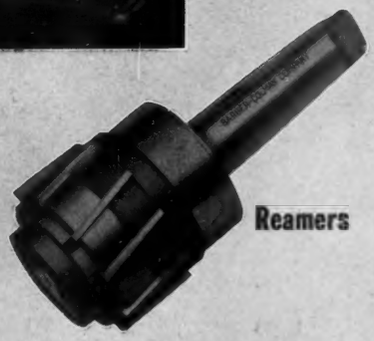
Reamer
Sharpening Machine

No. 12
Hobbing Machine



No. 3 Hobbing Machines

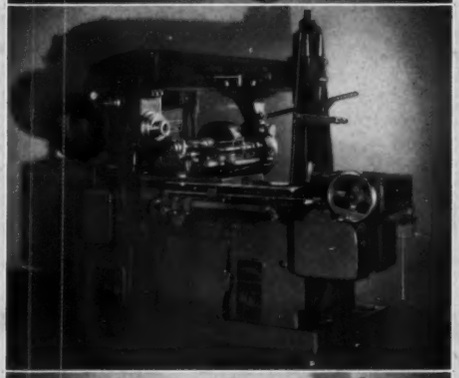




Reamers

Hob Sharpening Machines

Type A
Hobbing Machine



Milling
Cutters

HOBS

Type T
Hobbing Machine

BARBER-COLMAN COMPANY

MADE IN ROCKFORD, ILLINOIS, U. S. A.

BARBER-COLMAN OFFERS . . .

A Complete Hobbing Service

HOBBING MACHINES—The new Type S Automatic hobs spur gears and pinions for small precision instruments, capacity to 1" diameter by ½" face. Number 3 hobs spur and helical forms up to 5" diameter by 7" face; standard type for average commercial limits, precision type for extreme accuracy. Number 12 gives maximum hobbing on minimum investment, capacity to 12" diameter by 10" face. Type A provides high accuracy, high production, maximum operating convenience; capacity to 12" diameter by 12" face. Type T, in addition to ordinary work within its capacity, hobs *taper splines* which provide numerous new advantages for mounting machine members on shaft ends.

HOBS—Ground hobs for highest accuracy, production, value. Unground hobs for ordinary commercial accuracy, lowest first cost.

HOB SHARPENING MACHINES—Number 3 for hobs to 4" diameter by 4" face. Number 4 for hobs to 10" diameter by 12" face. Both automatic. Grind any make of straight- or helical-gashed hobs accurately with radial tooth-faces equally spaced.

ENGINEERING—Expert specialists for consultation about our standard Hobbing Machines and Hobs, for development of special applications.

INSPECTION—Trained operators demonstrate Barber-Colman Hobbing Machines on installation, inspect them periodically thereafter, help you solve unusual hobbing problems at any time.

Milling Cutters

Back of Barber-Colman Cutters are the same experience and facilities that have made Barber-Colman Hobs pre-eminent. Skillful cutter designers are available for consultation and cooperation in solving cutter problems.

Reamers

Barber-Colman Reamers are distinctive in design, highly successful in operation. In addition, their cutting edges are finished on the Barber-Colman Reamer Sharpener—an exclusive feature which has many advantages.

Reamer Sharpening Machine

The Reamer Sharpening Machine creates the unique cutting edge and extremely high accuracy which distinguish Barber-Colman Reamers, re-creates these qualities when purchased for servicing Barber-Colman Reamers used in high-production manufacturing.

Barber-Colman products have participated in the notable metal working achievements of the past 30 years, especially in the automotive field. They will continue to progress with Industry in the years to come. Inquiries about Barber-Colman products will be answered promptly, as usual; and the cooperation of our engineers is always available for developing new applications of standard or special Barber-Colman products.

BARBER B-C COLMAN

PRODUCTS

MILLING CUTTERS, HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, SPECIAL TOOLS

★

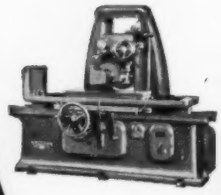
General Offices and Plant

ROCKFORD, ILLINOIS, U. S. A.

MADE IN ROCKFORD, ILLINOIS, U. S. A.

Work Costs Less On a—

MATTISON HIGH-POWERED PRECISION SURFACE GRINDER



Material: . . . . . Cast Iron Slide
Stock Removal: . Approx. .015" each surface
Previous Time: . . . . . 14 hours (scraped)
Present Time: . . . . . 1⅔ hours
Time Saving: 89%

Material: . . . . . Steel Table Slide Block
Stock Removal: . . .020" to .025" each surface
Previous Time: . . . . . 20 hours each
Present Time: 2½ hours each (3 pcs. per set-up)
Time Saving: 87%

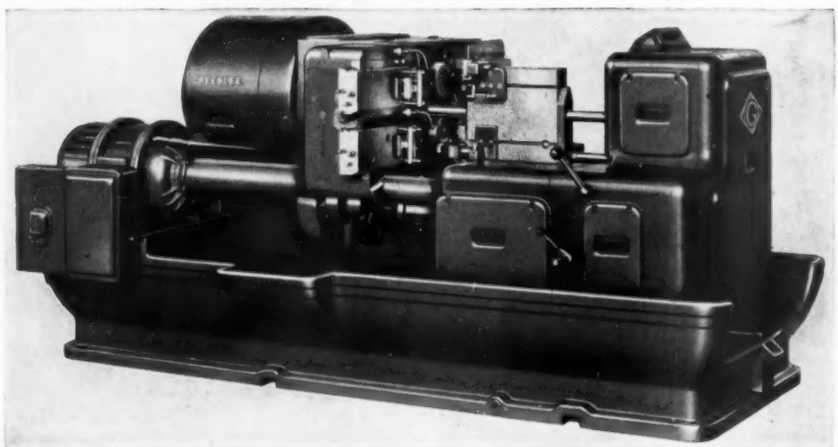
MATTISON MACHINE WORKS—ROCKFORD, ILLINOIS

For ~~SPEED~~ and ACCURACY

and all-round

OPERATING CONVENIENCE

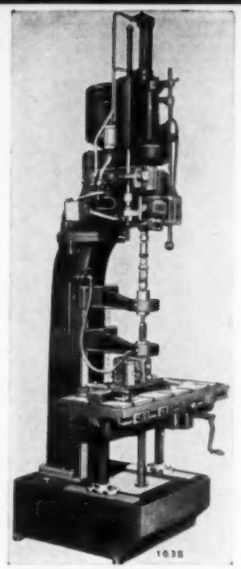
If you don't have a copy of this 16-page descriptive bulletin, send for one today.



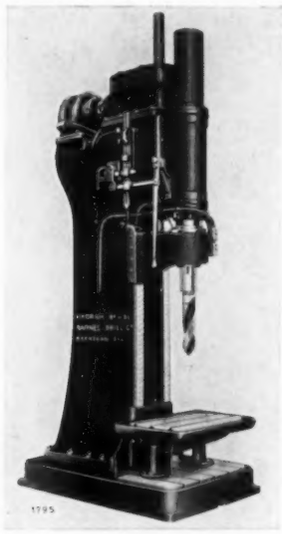
There is much that can be said about the various features of Greenlee Automatics, such as the improved method of feeding the tool slide, which eliminates cams; the shape of the tool slide, which increases its tool capacity; the built-in coolant system, which makes the tooling more accessible; and the numerous other features, which add to its value. But the important thing is that they contribute to the ability of these machines to produce at high speed, to maintain a high degree of accuracy and to provide for quick changes in set-up. These are the things you are especially interested in, and they are what you get when you buy a Greenlee.

GREENLEE BROS. & CO. • ROCKFORD, ILLINOIS

MADE IN ROCKFORD, ILLINOIS, U. S. A.

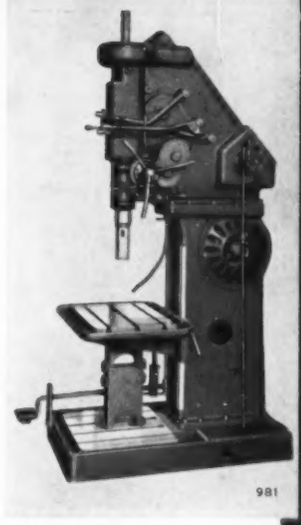


No. 194 Honer, at left. Unexcelled for finishing cylinders, bushings, gear-bores, and other work from ¾" to 4" inside diameter.

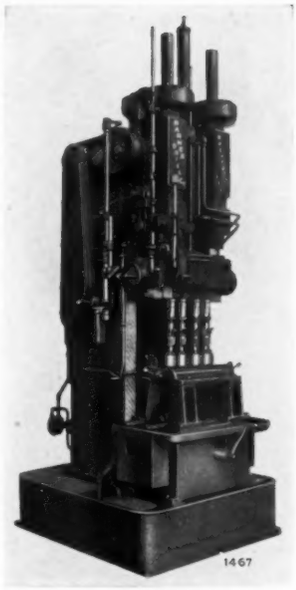


Hydram Heavy Duty Driller, below at left. Made in three standard sizes. Tremendously powerful. Has variable hydraulic feed directly over center of tools.

Directly below is a group of Hydram High Production Units passing final inspection by customer's representatives. Hydrams can be equipped with Multiple Spindle Auxiliary Heads and Indexing Tables for a variety of mass production operations.

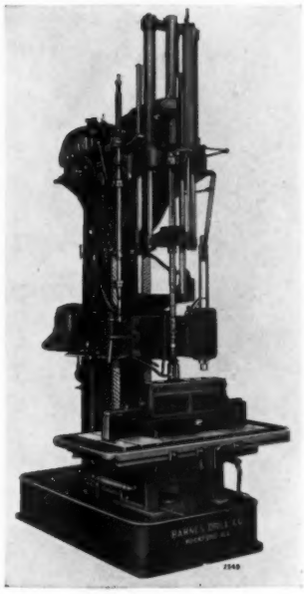


No. 242 Driller, above. Has quick change speeds and feeds, for variety of high-production manufacturing. Built in two smaller sizes, 221½ and 201¼. Also single-purpose types and sizes.



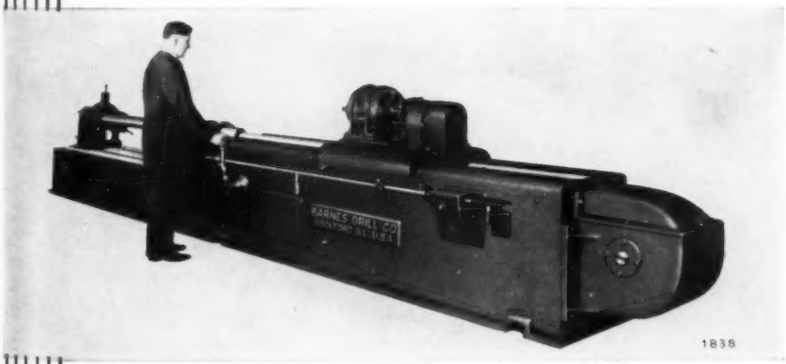
No. 214 Honer, above. For honing two to eight cylinders simultaneously. Cuts cost, increases production, improves product.

At right, Combination Boring and Honing Machine. Built in two sizes. Accurately mounted boring spindle can be swung aside to permit honing without moving work-piece. Especially suitable for small-lot manufacturing and reconditioning.



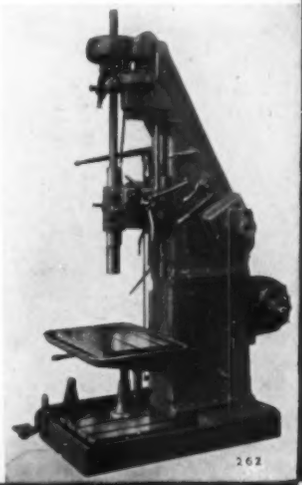
SELF-OILING, ALL-GEARED DRILLERS ..HYDRAULIC HONERS

Illustrated on this page are representative Self-Oiling, All-Geared Drilling Machines and Hydraulic Internal Honing Machines. In addition to these we build other standard sizes, and special combinations for a wide variety of drilling, and any internal honing whatever. We shall be glad to send promptly on request descriptions, specifications, and prices on any or all of our standard machines; and to prepare proposals on built-to-order equipment on receipt of your drawings and data. Write today for latest information on Self-Oiling, All-Geared Drillers and Hydraulic Honers. If you want the bulletins in a binder please ask for Catalog A.



Horizontal Honer, at left. For honing work too long to handle vertically. One of our latest honer developments. Has great possibilities for improving accuracy, quality, and reducing cost of finishing bores that have hitherto been difficult to machine to desired accuracy.

No. 262 Driller, at right. A wide range general purpose machine of great merit. Very popular for airplane motor building, tool shops, and general manufacturing.



BARNES DRILL CO. 830 Chestnut Street ROCKFORD, ILLINOIS

MADE IN ROCKFORD, ILLINOIS, U. S. A.

Sundstrand Products

Illustrated are typical standard Stub Lathes, Rigidmils, and other Sundstrand Machine Tools. These are available in other sizes and types, as indicated; in semi-standard or special designs as may be required. An outstanding characteristic of all Sundstrand Machine Tools is the simplicity and excellence of the basic designs which lend themselves readily to special applications most economically.

Our American Broach and Machine Division builds Broaching Machines, Fixtures, and Broaching Tools for any practical broaching operation.

Our Pump Division designs and builds the Sundstrand Hydraulic Pumps, Fluid Motors, Valves and Controls which are operating with notable success in our own and other machine tools.

Sundstrand engineers are expert in developing effective applications of our products and in designing fixtures for accurate work-holding and high production. Our local representatives will cooperate with interested manufacturing executives to compile and transmit accurate data on which our engineers will prepare reliable cost and production estimates.

Rigidmils

No. 2 Electromil, shown at left, has automatic electric table-control; is unexcelled for high speed milling on parts for business machines, household appliances, and the like. Smaller Rigidmils with Sundstrand Hydraulic Equipment, will soon be available. Larger sizes are mentioned below.

No. 3-C Rigidmil, shown at left, is slightly larger than No. 3-A and smaller than No. 4. All these are available with reciprocating or rotary tables, vertical or horizontal spindles, several different standard lengths, feed combinations, and spindle speed ranges; practically unlimited special applications.

Drilling and Centering Machines

No. 56, at left, operates on one or both ends of work simultaneously or independently to drill, ream, countersink, spotface, etc. Versatile, efficient, economical.

Stub Lathes

Models 8 and 10 are typified by illustration above. Accurate, simple, durable. Automatic operating cycle includes rapid traverses of 250" a minute. Easily set up, no special cams or parts necessary. Hardened steel ways, complete lubrication, and other features insure long life. Lengths, speeds, and feeds, available for wide variety of work.

Tool Grinders

Two-wheel type shown at left. For accurate, rapid, economical grinding of single-point cemented carbide and other cutting tools. Three-wheel type also available.

SUNDSTRAND MACHINE TOOL CO. S ROCKFORD ILLINOIS U.S.A.

SUNDSTRAND MACHINE TOOL CO.

2533 Eleventh Street • Rockford, Illinois, U. S. A.

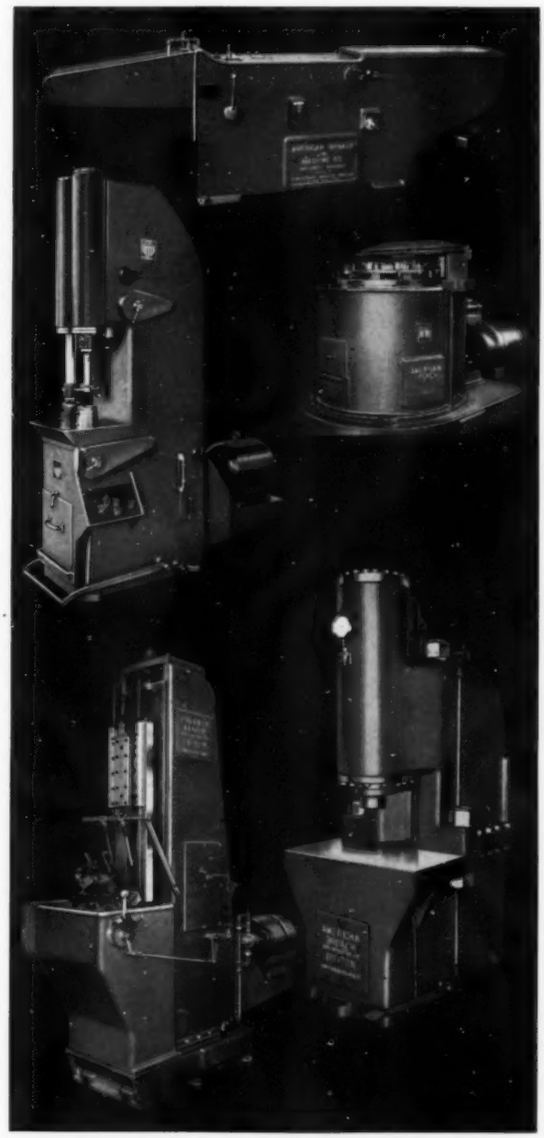
MADE IN ROCKFORD, ILLINOIS, U. S. A.

AMERICAN BROACHING

• A COMPLETE SERVICE with Nation-Wide Representation

A Division of SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

Typical American Broaching Machines are shown at right. Detailed information about these, and others in our complete line, supplied promptly on request.



Machines—A complete line of standard and special machines, vertical, horizontal, and rotary, automatic and semi-automatic, for every practical internal, external or surface broaching operation. In addition, a wide variety of Hydraulic Presses for straightening, bending and assembling.

Broaches—With a personnel having more than 34 years experience in broaching, a Tool Department specially equipped for broach manufacture and staffed by specialists, we design and manufacture broaches, of any size or shape, that are unexcelled for accuracy, durability and economy. Certain standard broaches are carried in stock. Prompt deliveries on specials.

Fixtures—Our engineers are expert in designing work-holding devices that meet the most rigid requirements for accurate locating, quick, secure clamping, and completely successful operation.

American Broaching cuts costs, increases production, delivers complete units ready to run and accepts entire responsibility for machines, broaches, and fixtures.

Representatives—We have carefully selected, competent, trustworthy representatives in the territories listed below (names and addresses supplied promptly on request). Consult these men freely on all broaching problems, or write us direct if you prefer.

Boston, Mass.	Milwaukee, Wis.
Buffalo, New York	Minneapolis, Minn.
Chicago, Illinois	New York City
Cincinnati, Ohio	Philadelphia, Pa.
Cleveland, Ohio	Pittsburgh, Pa.
Dayton, Ohio	St. Louis, Mo.
Detroit, Mich.	San Francisco, Calif.
Houston, Texas	Seattle, Wash.
Indianapolis, Ind.	Syracuse, N. Y.
Los Angeles, Calif.	Toledo, Ohio

Toronto and Windsor, Ontario, Canada

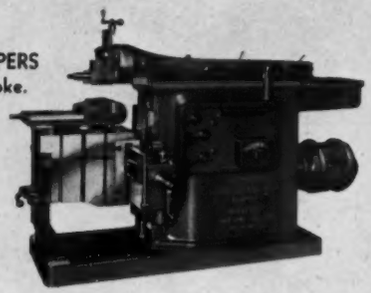
AMERICAN BROACH & MACHINE COMPANY, Ann Arbor, Michigan, U. S. A.

BROACHING MACHINES, PRESSES, BROACHING TOOLS, SPECIAL MACHINERY

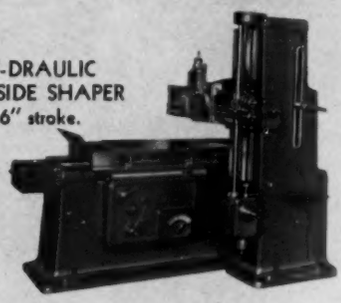
A Division of

SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U. S. A.

HY-DRAULIC SHAPERS
From 12" to 28" stroke.



HY-DRAULIC
OPENSIDE SHAPER
36" stroke.

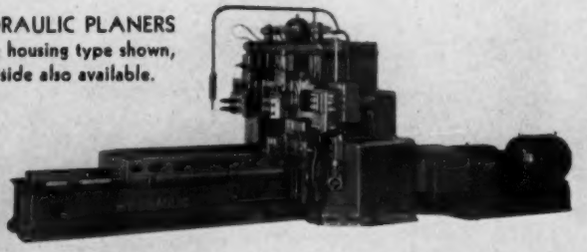


PLANERS ● SHAPERS

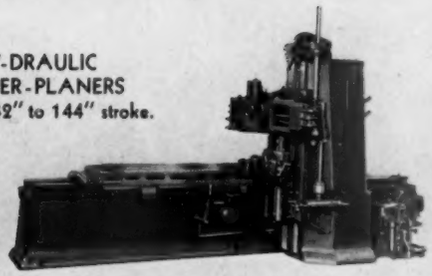
Hy-Draulic

SHAPER-PLANERS

HY-DRAULIC PLANERS
Double housing type shown,
Openside also available.



HY-DRAULIC
SHAPER-PLANERS
From 42" to 144" stroke.



Hy-Draulic Machine Tools — Shapers, Planers, and Shaper-Planers — are pioneers of their types, proved by years of experience, guaranteed as to materials and workmanship. These Machines all possess the overwhelming advantages of hydraulic drive and hydraulic feeds indicated below.

Standard Motor Drive —Standard constant speed motor is coupled directly to hydraulic unit. No special additional equipment or electrical reversing mechanisms.

Uniform Cutting Pressure — Cutting pressure is uniform throughout the stroke from start to finish of every chip.

Stepless Speed Adjustment— Cutting speed is infinitely adjustable throughout the several speed ranges, remains constant for each setting.

High Return Ratio — Return ratios are independent of cutting speeds, much higher than any obtainable through rigidly connected mechanical drives. Reversals are shockless.

Fine Finish — Hy-Draulic drive has no gears, racks, links, or joints to transmit marks to the work. Finish is smooth, uniform, unexcelled.

Precision — Work produced on these machines meets the most exacting requirements for accuracy.

High Production — Instant and exact adjustability of cutting speed and Hy-Draulic feed for best results, high return ratio, easy set-up, convenient controls, and simple operation all combine to provide maximum production.

Long Tool Life— The Hy-Draulic drives lengthen tool-life between grinds an average of 50%.

Economical — Small number of moving parts, inherent and complete lubrication, rugged design, high grade materials and workmanship make Hy-Draulic Machine Tools extremely economical to operate.

Write, today, for complete information about the exclusive features and advantages of Hy-Draulic Machine Tools.

ROCKFORD MACHINE TOOL CO.

ROCKFORD, ILLINOIS, U.S.A.

MADE IN ROCKFORD, ILLINOIS, U. S. A.

PERFORMANCE PROVED!

SUNOCO STARTS ANOTHER YEAR AS A LEADER AMONG CUTTING LUBRICANTS

YEAR after year industry has recognized SUNOCO Emulsifying Cutting Oil as a leader in the field of cutting lubricants.

Grinding...milling...drilling...turning—SUNOCO has proved, by performance, its right to recognition wherever machine tools—"The Master Tools of Industry"—are operated. Its high lubricating and heat absorbing qualities prolong tool life and lessen down time, with resultant increased production and fewer rejects.

Call on our Cutting Oil Engineers for expert advice and accept, with the utmost confidence, their recommendations that are backed by years of actual field experience.

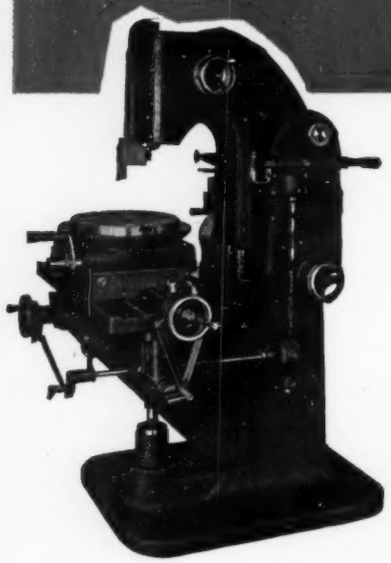
SUN OIL COMPANY, PHILADELPHIA, PA., U. S. A.

Subsidiary Companies:

Sun Oil Co., Ltd., Montreal, Toronto • British Sun Oil Co., Ltd., London, England

SUNOCO
EMULSIFYING
CUTTING OIL

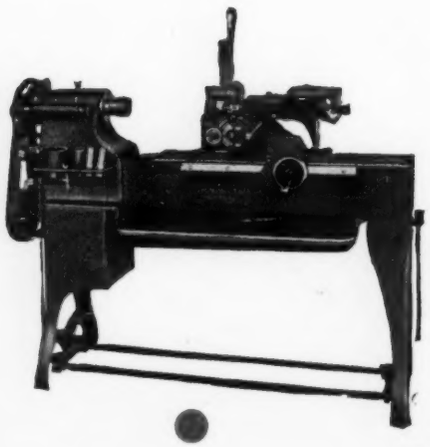
Outstanding Contributions to



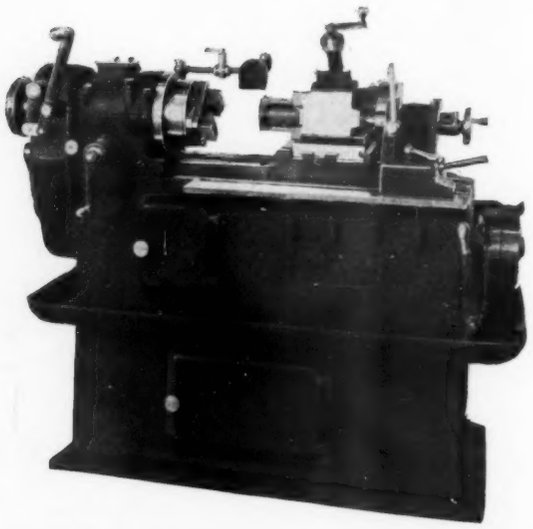
Hanson-Whitney Universal Vertical Tool and Die Shaper—a fast, accurate machine for dies and tools which insures outstanding savings on a wide variety of work.

Hanson-Whitney Tools and Machines assist many leading shops to achieve worth while increases in production, lower tool costs and minimized spoilage. By attaining laboratory precision on the production line, Hanson-Whitney contributes to interchangeable manufacturing and eliminates production delays.

The Hanson-Whitney Line includes Die Shapers, Centering Machines, Automatic Threading Machines, as well as Hanson Process finished-after-hardening Taps, Hobs, Gauges and other precision tools.



Hanson-Whitney Rapid Precision Centering Machine—a big saver in time and labor—rotates the work while supported in a 3-point center rest.



Hanson-Whitney Universal Semi-Automatic Thread Milling Machines—are fast, precision machines for handling external or internal thread milling. Right or left hand threads are produced practically perfect in lead and pitch through the use of a hob which is finished-after-hardening.

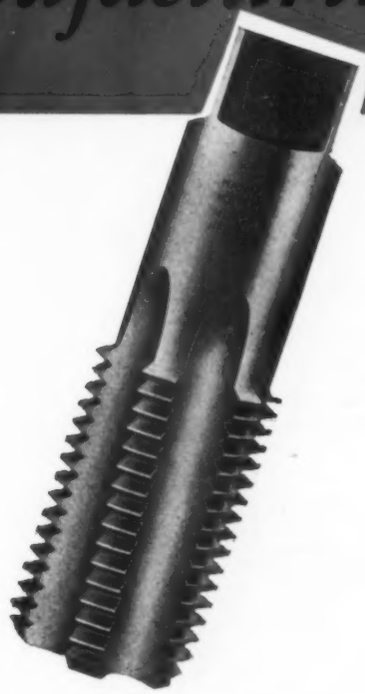
The Hanson-Whitney Machine Company

HARTFORD, CONN., U.S.A.

Interchangeable Manufacturing

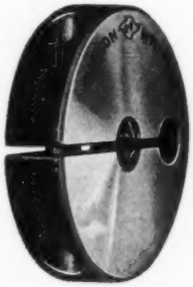
In the tap field, Hanson-Whitney covers a range in diameters from 1/16" to 7½" and leads 100 pitch to 7" lead. All types of thread including U.S.F., Acme, Whitworth, Ratchet or Buttress can be generated. Special requirements in diameter, taper, lead, form, etc. can be supplied.

The complete line of Hanson-Whitney gages includes those for both external and internal threads.



One of the long line of "Hanson-Process" Taps available.

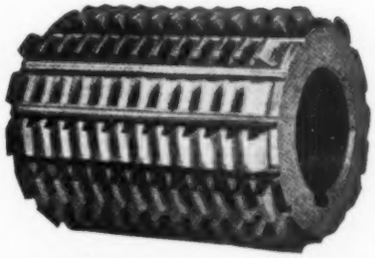
All taps produced by Hanson-Whitney are "finished" after hardening including thread and shank.



Thread Gages in the Hanson-Whitney line are "finished-after-hardening" by the "Hanson Process."

Taper Pipe Taps of high speed steel — available from Hanson-Whitney in sizes from ⅛ in. to 2 in. are "finished-after-hardening."

Every dimension of Hanson-Whitney Taps is under complete, accurate control through the "Hanson Process."



Extreme accuracy and durability of Hanson-Whitney Hobs is assured by the "Hanson Process" of finishing-after-hardening.

DOMESTIC REPRESENTATIVES

MACHINERY and SMALL TOOLS—Cincinnati, Ohio, Seifreat-Elstad Mchy. Co.; Dayton, Ohio, Seifreat-Elstad Mchy. Co., Detroit, Mich., Berry Thomas; New York, N. Y., L. C. Biglow & Company, Inc.; Pittsburgh, Pa., William K. Stamets; Rochester, N. Y., A. G. Brice; Houston, Texas, Wessendorf, Nelms & Co.; Toronto and Montreal, Canada, Arthur Jackson Mche. Tool Co.

MACHINERY ONLY—Chicago, Ill., Marshall & Huschart Mchy. Co.; Cleveland, Ohio, William K. Stamets; Philadelphia, Pa., Lloyd & Arms, Inc.

SMALL TOOLS ONLY—Chicago, Ill., M. Ray Pearce; Cleveland, Ohio, George A. Whalon; Milwaukee, Wisc., George M. Wolff, Inc.; Philadelphia, Pa., General Tool Sales Co.

Grinders Backed By Experience

For many years industry has expressed a preference for precision grinding machines of our manufacture. In these new high speed Hydraulic Feed Surface Grinders, we have combined the ruggedness so necessary to long life with the extreme accuracy and high speed so necessary to maximum productive capacity.

- **Finger tip control—accurate and convenient.**
- **Speed — from practically nothing to 150 feet per minute.**
- **Cross feed—carries automatic reverse mechanism.**
- **Vertical movement — power with hand adjustment to .0001 inch.**
- **Wet grinding — self-contained motor-driven coolant system.**
- **Spindle drive—standard with balanced motor.**
- **Table width—12", 14", 16", 18", 20" and 24".**
- **Table length—36" to 144".**

This machine is the 20" x 72" GRAND RAPIDS Hydraulic Feed Cross Sliding Head Surface Grinder with self-contained motor drive and motor-driven coolant system. (Table splash guards removed.)

Our catalog will give you intimate word glimpses of our various styles.

GALLMEYER & LIVINGSTON CO.
300 Straight Street, Grand Rapids, Mich.

The Stage is Set

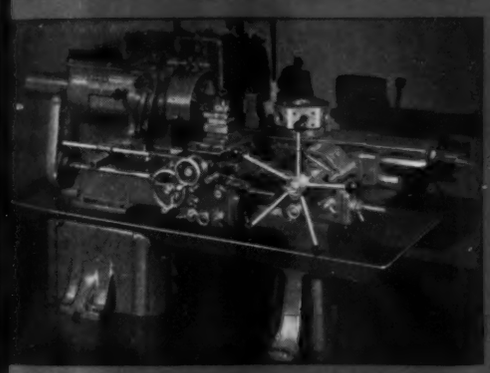
TO CUT YOUR COSTS IN 1938

New Gisholts have set the stage . . . giving you a sure way to make more money in 1938. Each one, regardless of size, offers new refinements that assure quicker setup, faster cutting, simpler operation and greater precision. These advantages enable the new Gisholts to save an average of over 35% of machining costs wherever they replace older machines.

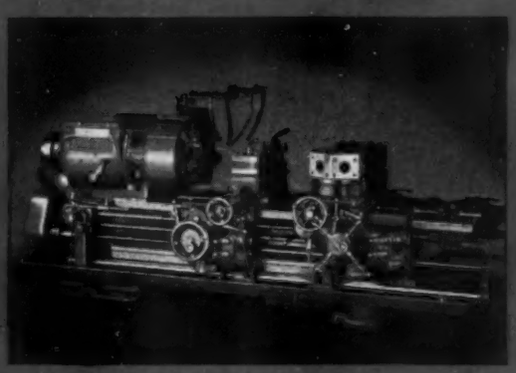
Keen executives are capitalizing on these high-speed Gisholts to increase output and cut costs, not only for this year, but for years to come.

It will pay you to recheck your present methods and equipment, *now*. Ask the nearest Gisholt engineer to call. Or write us for the latest information on Gisholt Turret Lathes and Balancing Machines.

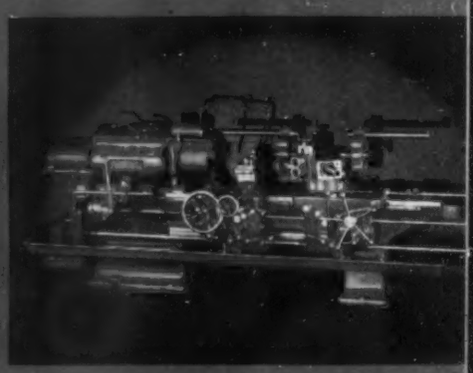
GISHOLT MACHINE TOOLS



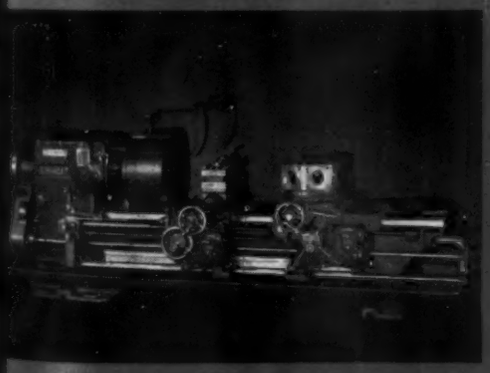
Gisholt Universal Ram Type Turret Lathes
No. 3–1⅛"x10" bar cap., 8" or 10" chuck, 18½" swing
No. 4–2"x12" bar cap., 8" or 10" chuck, 18½" swing
No. 5–2⅛"x14" bar cap., 10" or 12" chuck, 19¼" swing



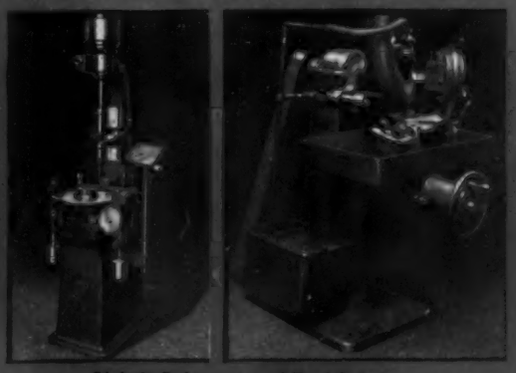
Gisholt Heavy Duty Turret Lathes
3AL—6¼" or 7⅛" spindle bore, 21" chuck, 27" swing



Gisholt High Production Turret Lathes
1L—2⅛"x36" bar cap., 12" chuck, 19" swing
2L—3⅛"x48" bar cap., 15" chuck, 22⅜" swing
3L—4⅛"x48" bar cap., 18" chuck, 26⅜" swing



Gisholt Heavy Duty Turret Lathes
[illegible]-9¼", 10⅛" or 12¼" spindle bore, 24" chuck, 28" swing
[illegible]-9¼", 10⅛" or 12¼" spindle bore, 28" or 32" chuck, 34⅛" swing



Gisholt Balancers and Tool Grinders.
Static Balancers—4 sizes
Dynamic Balancers—5 sizes
Tool Grinders—for single point tools

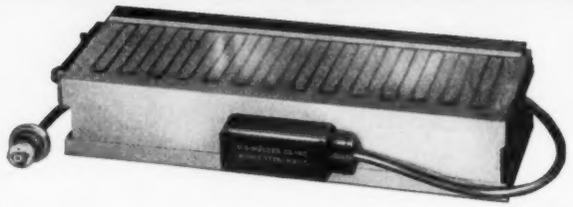
Gisholt Simplimatics—
Platen type—18" or 24" chuck
Radial type—18" or 24" chuck

GISHOLT MACHINE COMPANY

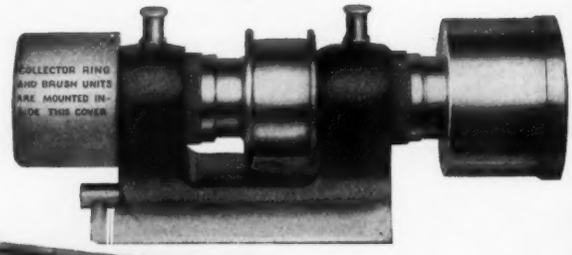
1201 EAST WASHINGTON AVENUE, MADISON, WISCONSIN, U. S. A.

TURRET LATHES · AUTOMATIC LATHES · TOOL GRINDERS · BALANCING MACHINES

WALKER... MAGNETIC CHUCKS SURFACE GRINDERS

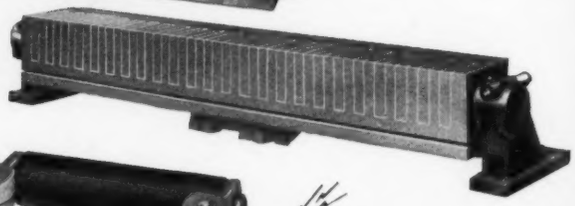


No. 618 all steel magnetic chuck — in sizes from 4″ x 8″ to 20″ x 96″.

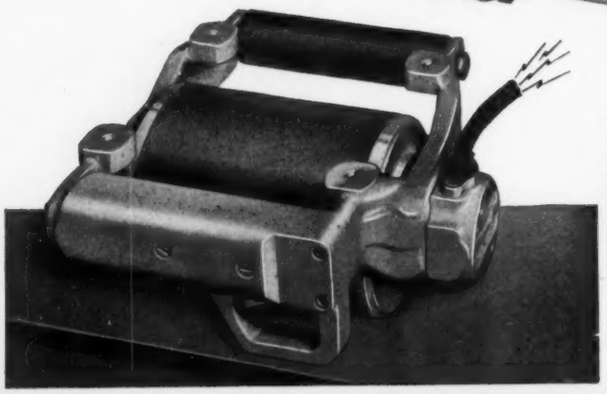


Collector ring and brush unit available for all sizes of rotary chucks.

No. 617 bar pole magnetic chuck for holding small, thin work. Sizes from 6″ x 10″ to 12″ x 60″.



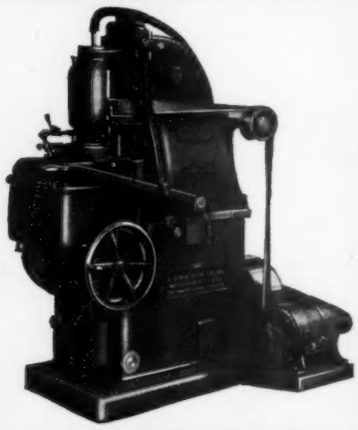
Walker Swivelling Type Magnetic Chuck; 10½″ x 10½″. New in design with central control. Available in lengths up to 17′.



Walker Portable Type AC Demagnetizer for removing residual magnetism from machine knives, shear blades, large dies, etc. Switch for control built into "Pistol Grip" handle. Current is on only when in use.

CUT GRINDING COSTS
ON A WIDE RANGE OF WORK

O. S. WALKER CO., INC.
Worcester, Mass., U. S. A.



WALTHAM
TRADE MARK
REG. U.S. PAT. OFF.
MACHINES

SUB-PRESSES . . . THREAD MILLERS . . . GEAR & PINION CUTTERS

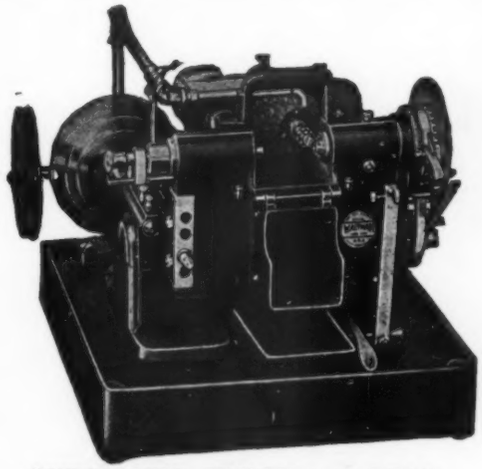
SUB-PRESSES and DIES

These units are available in both arch and overhang types, produce parts which are ready for assembly or for other additional operations. The high precision, clean work produced eliminated the necessity for hand finishing and results in time saving.

Accuracy is maintained in continuous service because of rigid construction and perfect alignment. Adjustment for wear is provided.

Made in sizes up to 6 inch plunger diameter.

WALTHAM MACHINES have been developed to meet the modern needs for lower cost production and closer accuracy. You can include these machines in your modernization program with the definite assurance that they will pay you high returns on the investment.

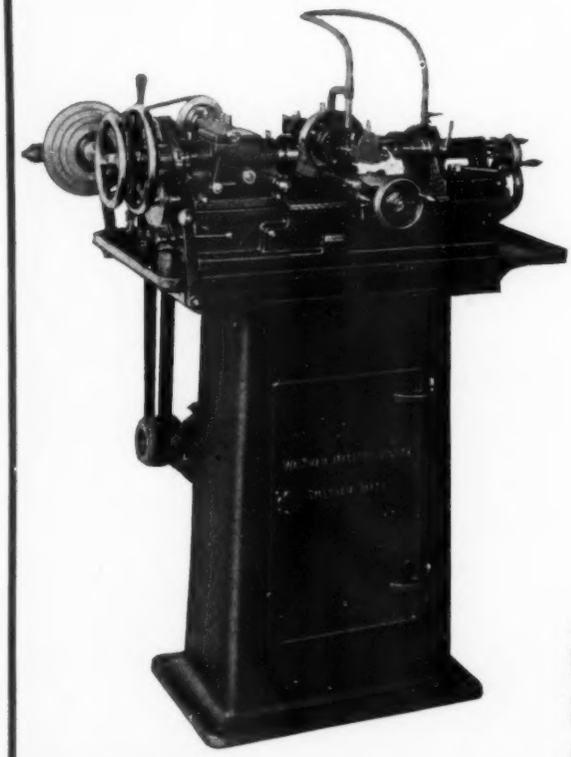


AUTOMATIC PINION and GEAR CUTTERS

WALTHAM has developed this machine to a point where any workman on the production line can achieve tool room standards of accuracy.

It has a capacity for cutting small gears and pinions up to 1½ inch pitch diameter—an ideal, fast, high production machine for cutting watch, meter and gauge pinions, gears or sectors. Fully automatic operation is available with magazine feed.

Waltham also offers a 4 inch size. Cutters available for both sizes.



THREAD MILLERS

WALTHAM offers these machines for semi-automatic production or tool room service. They assure precision threading of small parts will cut V, N.S., Form, Acme, Whitworth, and Buttress threads as well as many special types.

Waltham Thread Millers will handle threads and worms up to 2 inches in diameter. Threads already cut can be easily matched and interchangeable parts produced in any quantity.

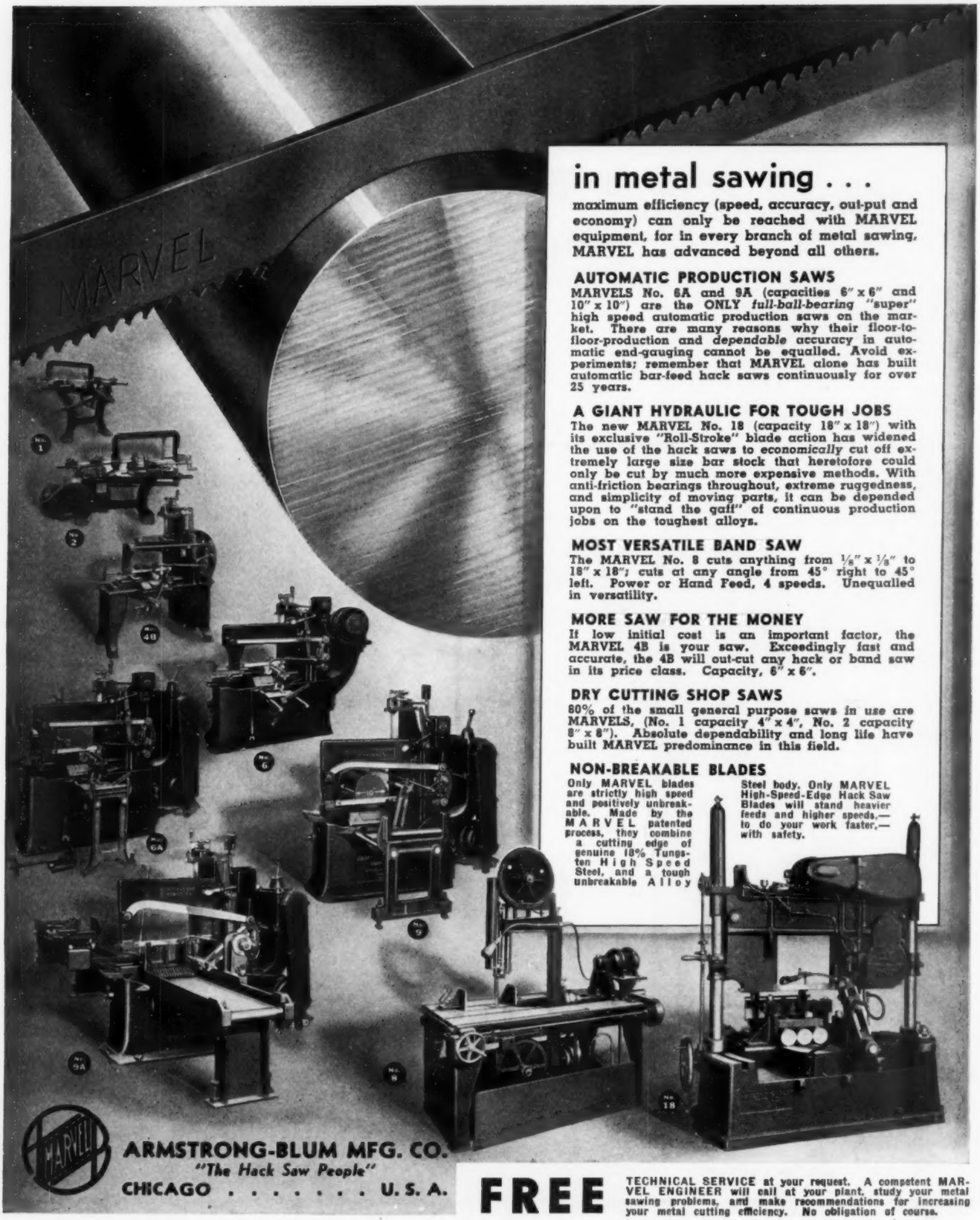
Made in bench type with countershaft drive and in floor type with motor drive.

WALTHAM MACHINE WORKS

HIGH STREET WALTHAM, MASS.

Maximum Efficiency means MARVEL

MARVEL Sawing Machines . . MARVEL Blades



in metal sawing . . .

maximum efficiency (speed, accuracy, out-put and economy) can only be reached with MARVEL equipment, for in every branch of metal sawing, MARVEL has advanced beyond all others.

AUTOMATIC PRODUCTION SAWS

MARVELS No. 6A and 9A (capacities 6″ x 6″ and 10″ x 10″) are the ONLY *full-ball-bearing* "super" high speed automatic production saws on the market. There are many reasons why their floor-to-floor-production and *dependable* accuracy in automatic end-gauging cannot be equalled. Avoid experiments; remember that MARVEL alone has built automatic bar-feed hack saws continuously for over 25 years.

A GIANT HYDRAULIC FOR TOUGH JOBS

The new MARVEL No. 18 (capacity 18″ x 18″) with its exclusive "Roll-Stroke" blade action has widened the use of the hack saws to *economically* cut off extremely large size bar stock that heretofore could only be cut by much more expensive methods. With anti-friction bearings throughout, extreme ruggedness, and simplicity of moving parts, it can be depended upon to "stand the gaff" of continuous production jobs on the toughest alloys.

MOST VERSATILE BAND SAW

The MARVEL No. 8 cuts anything from ⅛″ x ⅛″ to 18″ x 18″; cuts at any angle from 45° right to 45° left. Power or Hand Feed, 4 speeds. Unequalled in versatility.

MORE SAW FOR THE MONEY

If low initial cost is an important factor, the MARVEL 4B is your saw. Exceedingly fast and accurate, the 4B will out-cut any hack or band saw in its price class. Capacity, 6″ x 6″.

DRY CUTTING SHOP SAWS

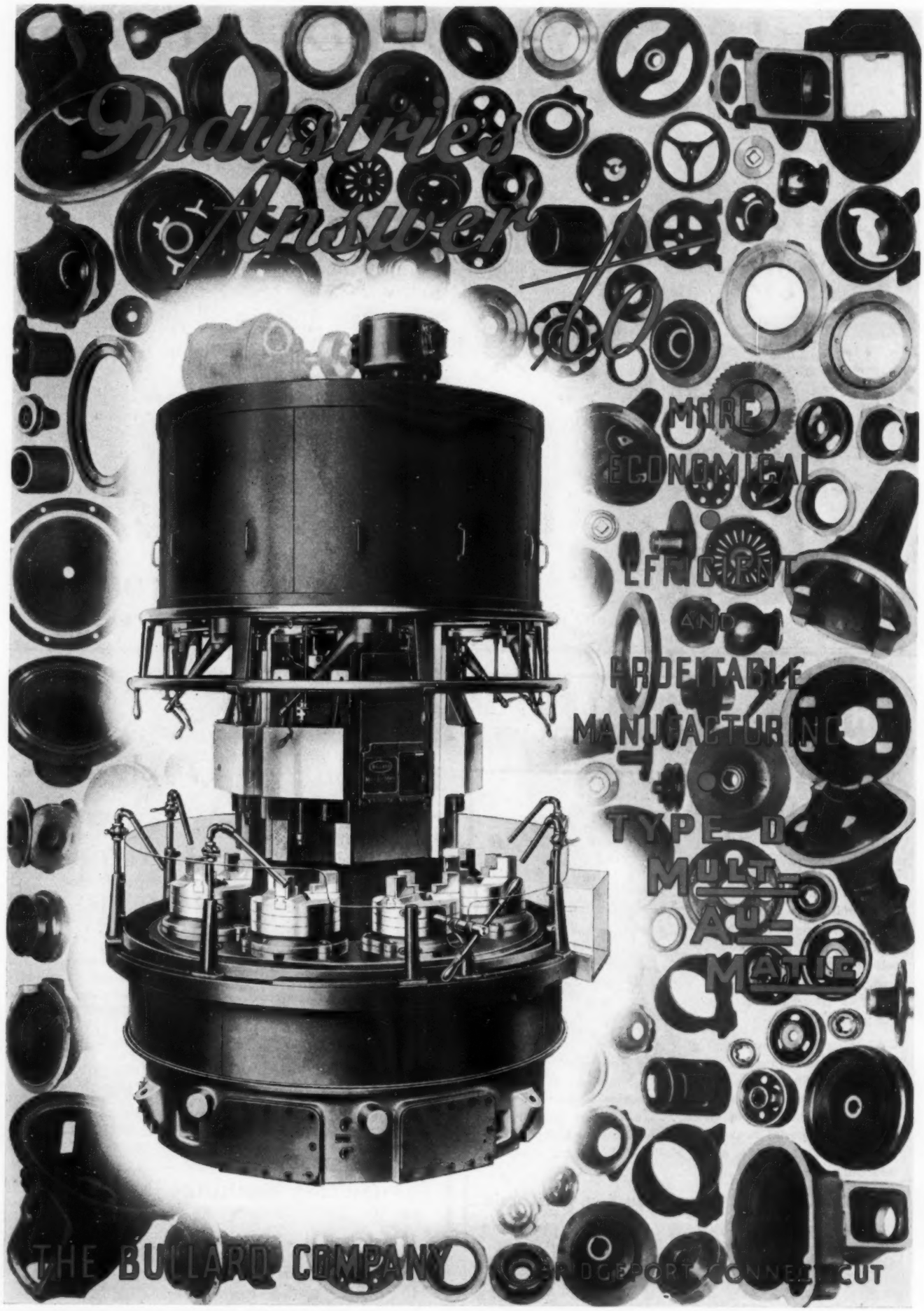
80% of the small general purpose saws in use are MARVELS, (No. 1 capacity 4″ x 4″, No. 2 capacity 8″ x 8″). Absolute dependability and long life have built MARVEL predominance in this field.

NON-BREAKABLE BLADES

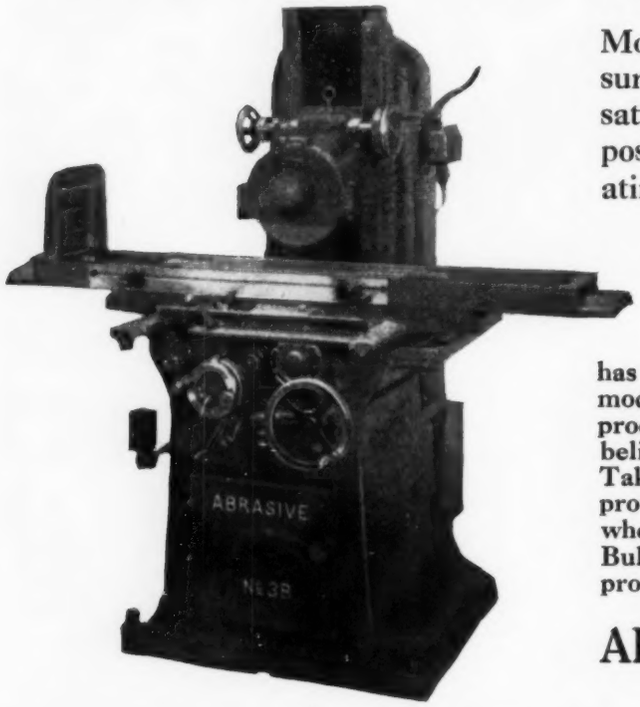
Only MARVEL blades are strictly high speed and positively unbreakable. Made by the MARVEL patented process, they combine a cutting edge of genuine 18% Tungsten High Speed Steel, and a tough unbreakable Alloy Steel body. Only MARVEL High-Speed-Edge Hack Saw Blades will stand heavier feeds and higher speeds,—to do your work faster,—with safety.

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
CHICAGO . . . . . U. S. A.

FREE TECHNICAL SERVICE at your request. A competent MARVEL ENGINEER will call at your plant, study your metal sawing problems, and make recommendations for increasing your metal cutting efficiency. No obligation of course.


Industries Answer
MORE
ECONOMICAL
AND
MANUFACTURING
TYPE D
MULTI-
AUTOMATIC
THE BULLARD COMPANY
BRIDGEPORT, CONNECTICUT

HIGHLY DEVELOPED . . . to meet the most exacting requirements!



Modern Machine Tool practice develops many surface grinding requirements which can only be satisfied by a machine embodying the highest possible standards of speed, precision, and operating convenience.

The New Abrasive 3B Automatic Surface Grinder

has been developed to meet the most severe demands of modern tool room practice, and also for many types of production work. Fast, accurate, and powerful beyond belief; it is also unsurpassed for safety and durability. Takes any type of work up to 24″ x 8″ x 12″, and has proved its ability to cut production costs extensively wherever there is sufficient work to keep it busy. Bulletin containing complete information furnished promptly on request.

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE, R. I.

HIGH SPEED *Shears*

FOR CUTTING IRREGULAR SHAPES FROM SHEET METAL

Meet all requirements for such work—standard equipment furnished for ring and circle cutting . . . absolutely accurate and easily operated . . . metal is sheared and not punched.

Cut anywhere, no starting holes required for inside cutting . . . only one adjustment for various thicknesses of material used . . . unobstructed cutting vision . . . no further finishing required. No special cutters, pilots, templates, or strippers are needed . . . long life shear blades. Write for complete information.

LIBERT MACHINE CO., Green Bay, Wisconsin
Manufacturers of shears since 1915

Libert Method

Giant KEYSEATERS

For cutting internal keyways, slots or splines 1/16″ to 4″ wide and up to 60″ long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

MITTS & MERRILL
913 Tilden St.
Saginaw, Michigan

LUCAS "PRECISION"
Horizontal Boring, Drilling and Milling Machine
THE LUCAS MACHINE TOOL CO.
NOW AND ALWAYS OF
CLEVELAND, OHIO, U. S. A.

LELAND-GIFFORD COMPANY · MACHINE TOOLS-CRANK SHAFTS · WORCESTER MASS. U.S.A.

Drilling and Tapping Machines
(Automatic and Semi-Automatic)
LELAND GIFFORD CO.
WORCESTER, MASS.

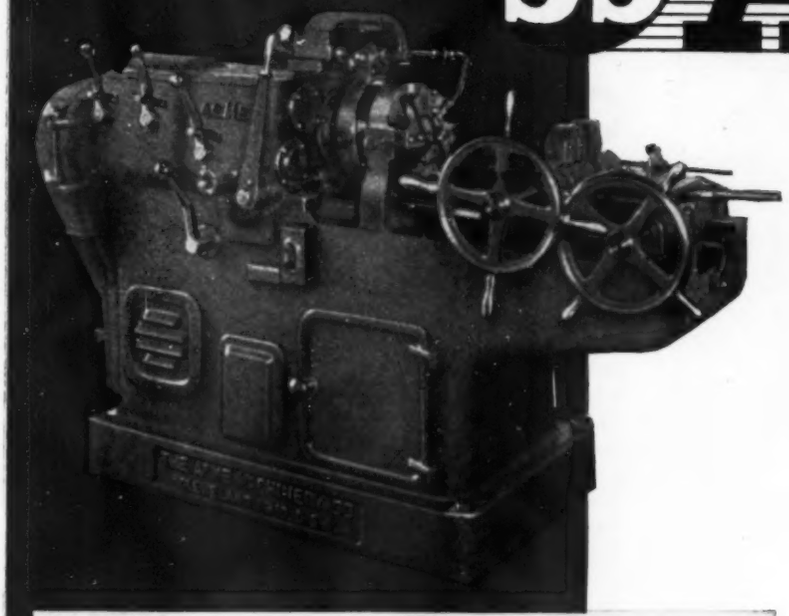
Die-Making Machines

They save 50% on sawing, filing and lapping operations, easily maintaining .002″ limits. Ask for special bulletin—also circulars on Drill pointers, Point Thinners, Mill Cutter Grinders and Tap Grinders.

OLIVER OF ADRIAN

Oliver Instrument Co., 1414 Maumee St., Adrian, Mich.

MODEL 35 ACME

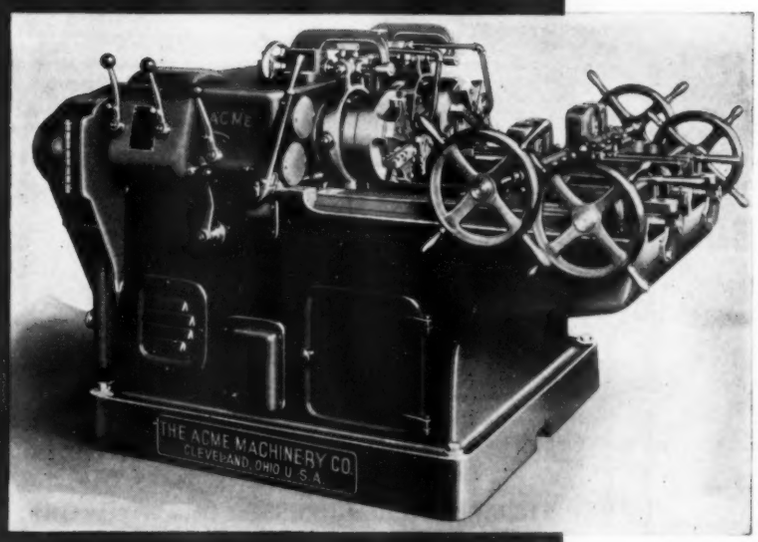


THREADING MACHINES

SINGLE...

Even the smallest and simplest of Model 35 ACME Threading Machines provides every convenience for ease and flexibility of operation plus high speed, profitable production.

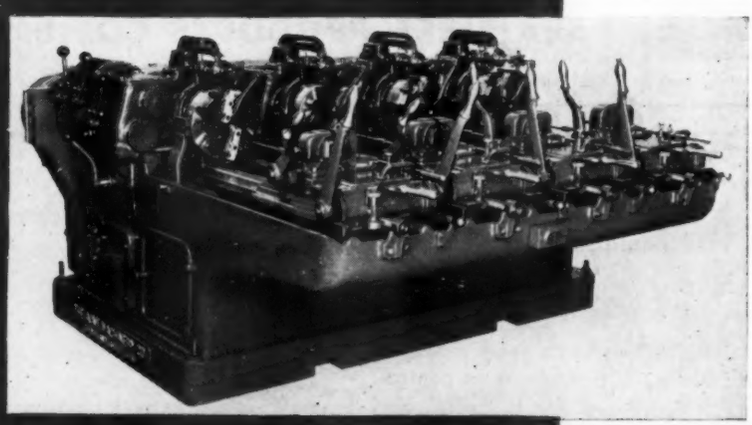
Furnished with either tangent or hobbed die head. Eight progressive speeds through a self-contained selective type gear box. Changes controlled by conveniently located levers at front of machine. Belt or constant speed motor drive.



DOUBLE...

Class A double bolt threading machines are built in all sizes up to and including six inch diameter. Constant speed motor drive. Equipped with two independent tangent die heads arranged for operation of one while the vise or chuck of the other is being loaded. These and the lead-screw nuts are provided with hand and automatic feed throughout.

All shafts and gears are mounted on preloaded anti-friction bearings. Vise jaws adjustable for maintaining alignment with center line of spindle.



QUADRUPLE...

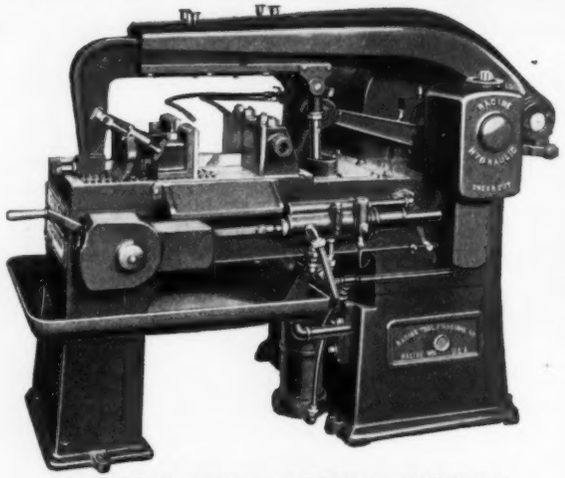
Allowance for adjustments to 1/1000 of an inch without stopping the form independently operated dieheads is the chief feature of this most recent addition to the ACME family of machine tools . . . making possible precision threading on a quantity basis never before reached.

Carbon steel, heat treated ways assure accurate movement of carriage without wear . . . while a double rack and pinion eliminate carriage cramping in the ways.

(Refer to our Forging Machine advertisement on page 191)

THE ACME MACHINERY CO.
CLEVELAND, OHIO, U.S.A.

RACINE



HYDRAULIC METAL-CUTTING MACHINES

The Modern Production Saw that is making new records in steel mills, warehouses and machine shops.

FULL HYDRAULIC CONTROL

Dependable Performance at cutting rates never before obtained with reciprocating power saws. A complete line, 6x6" to 14x20".

"Standard the World Over"

RACINE TOOL & MACHINE COMPANY

1751 State St. Racine, Wisconsin

MODERN DIE-MAKING MACHINES

File Your Way to LOWER COSTS *with...*

GROB

Continuous Motion

DIE-FILING MACHINES

Here is the continuous die-filing machine that industry has long been waiting for! A machine that will step-up production . . . combine speed with accuracy . . . cut production costs . . . operate with ease and precision. It has every desirable feature for modern scientific die-making.

Pat. No. 1958477
RE 19999 Pat. Pend.

GROB BROTHERS
GRAFTON, WISCONSIN

Solve Production Problems

WITH "NOBLEWEST" MARKING EQUIPMENT

Modernize your marking operations with cost-reducing equipment. Designed by specialists in production marking problems, these machines operate at higher speeds, and in some cases perform several marking operations at once, and unload automatically. Write for catalog and information on rapid-production marking equipment to fit your particular needs.

THE NOBLE & WESTBROOK MFG. CO.
"FINE MARKING TOOLS"
17 Westbrook Street East Hartford, Connecticut

LATHES { TOOL ROOM / PRODUCTION

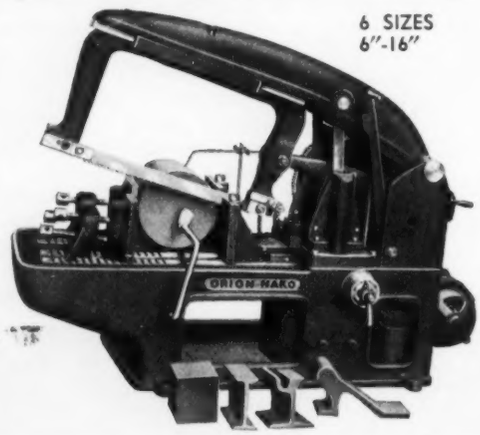
Special Machinery • Founders

The SPRINGFIELD MACHINE TOOL COMPANY
Springfield, Ohio, U. S. A.

SEAMLESS Steel Cans (Leak-Proof "KANTAINERS")
SEAMLESS Steel Barrels
STAMPINGS and PRESSED DRAWN WORK in Steel, Stainless Steel and other Metals

SEAMLESS PRODUCTS CO., Inc.
113 WEST 42ND ST., NEW YORK, N. Y.

6 SIZES
6"-16"



HYDRAULIC POWER HACKSAWS
with fully automatic cutting cycles

Double-acting, self-contained Pump Unit sealed for life-time, trouble-free service.

Over 5000 Machines supplied all over the world during past fifteen years.

Infinitely variable feed pressure, instantly available from 0 up to 500 lbs. thru single lever control.

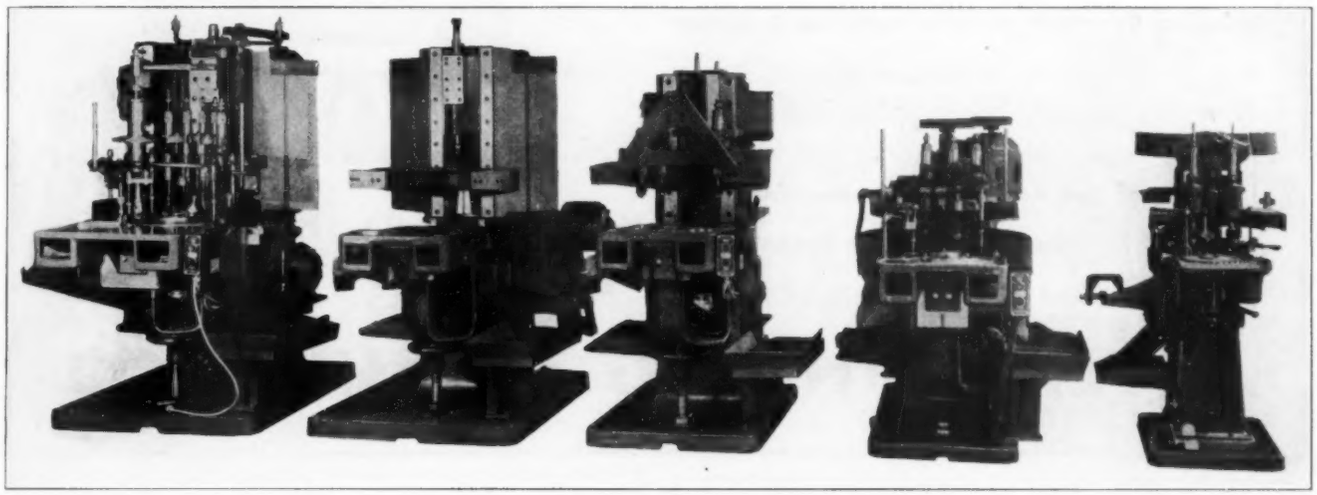
Oil-cushioned Feed, Relief- and Frame-Control and double-prismatic ways result in unexcelled production.

MARBURG BROTHERS, INC. ENGINEERS
88-90 West Street New York City

BODINE

Automatic Dial Feed

DRILLING, TAPPING & SCREW INSERTING MACHINERY



The Bodine Line—complete and partially assembled on floor of Erecting Room.

. . . in the following types and sizes

	Machine No. (Left to Right above)					
	48-30	48-20	42-30	42-20	41-20	40-10
Capacity in Mild Steel Taps	2–1/2″	2–1/2″	2–3/8″	2–3/8″	2–1/4″	2–1/4″
Capacity in Mild Steel Drills	6–1/2″	6–1/2″	6–1/2″	6–1/2″	4–1/4″	4–1/4″
Diameter of Knee	32″	24″	32″	24″	24″	16″
Diameter of Dial	26″	18″	26″	18″	18″	11″
Max. Speed—Strokes per Min.	30	30	35	40	50	60
Maximum Vertical Stroke	3 1/2″	3 1/2″	3″	3″	2 1/4″	13/16″
Normal Size Main Motor	3 H.P.	3 H.P.	2 H.P.	2 H.P.	1 H.P.	1 H.P.
Approximate Weight	5500 lbs.	5000 lbs.	5000 lbs.	4500 lbs.	2000 lbs.	800 lbs.
Floor Space Required	46″x82″	46″x74″	46″x82″	46″x72″	40″x60″	30″x45″

The Bodine line of Automatic Dial Feed type of Drilling, Milling and Screw Inserting Machinery is not only complete but the design permits wide flexibility in operation. All types of operations can be performed simultaneously on one machine.

Fully automatic in every detail with the exception of feeding, these machines are designed for hopper feeding also when desired.

Bodine machines offer outstanding savings on high production work. Design is such as to permit rapid change from one job to another and thus reduce set up time to a minimum.

Our engineers will gladly study your production problem and offer recommendations for solving it.

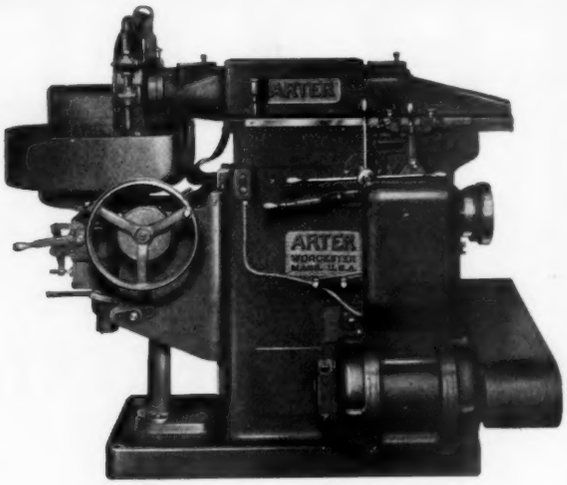
THE BODINE CORPORATION

379 MOUNTAIN GROVE ST., BRIDGEPORT, CONN.

ARTER ROTARY SURFACE GRINDERS

Diametrical Capacities
8" to 30"

Mechanical or Hydraulical



Model A—2"-16"

These machines are particularly designed for grinding your flat, circular work but they can also handle other shapes.

A rigidly ribbed, heavy, one-piece bed—a sturdy wheel slide—a chrome molybdenum heat-treated wheel spindle are the outstanding features of the Arter grinding machines.

Standard equipment includes an Arter high powered magnetic chuck.

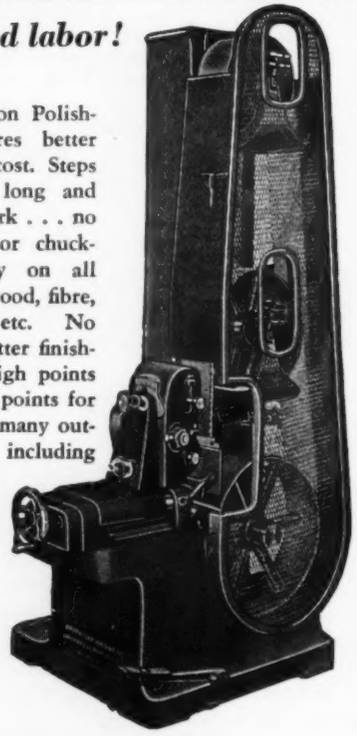
Send for full and detailed specifications.

ARTER GRINDING MACHINE CO.
WORCESTER • MASS.

HIGH PRODUCTION POLISHING

with unskilled labor!

Type "A" Production Polishing Machine insures better finishing at lower cost. Steps up production on long and short cylindrical work . . . no holding, centering or chucking. Saves money on all finishing of metal, wood, fibre, rubber materials, etc. No scratching. Gives better finishing by providing high points for cutting and low points for chip clearance. Has many outstanding features, including Duplex 2-belt system with finishing belt running over corrugated leather cushion belt. Send TODAY for complete information.



PRODUCTION MACHINE CO.
Grinding, Polishing, Finishing Machines
GREENFIELD, MASS.

Letters from "P.A.'s" . . .

. . . say such things as these about the Annual Buyers' Reference Number:

". . . very valuable data in addition to its value as a Where-to-Buy Directory. . ."
—AMERICAN STEEL FOUNDERIES

". . . certainly well gotten up and we appreciate having it. It will undoubtedly come in handy . . . this year."
—BARBER COLMAN COMPANY

"We find that this is of practical use to our buyers."
—BROOKLYN EDISON COMPANY, INC.

"In addition to being referred to by various key men in our plant, it will also be used as a buying directory. . ."
—CADILLAC MOTOR CAR DIVISION, GENERAL MOTORS CORP.

". . . a lot of useful and valuable information. I am going to keep this on my desk as a ready reference. . ."
—THE COOPER-BESSEMER CORPORATION

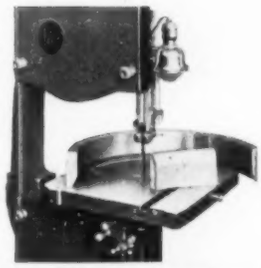
"This is a fine issue and will be very handy for future reference."
—HUDSON MOTOR CAR COMPANY

"The Handiest Tool In The Whole Shop!"

—Says One Superintendent about the New DELTA Metal-Cutting Band Saw

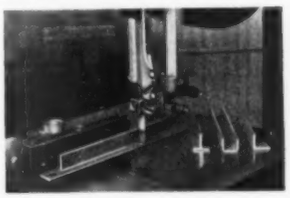
FOR CUTTING TEMPLATES
SAWING JIG AND FIXTURE PARTS
EXPERIMENTAL WORK
SHEET-METAL SAWING
SQUARING, MITERING AND FITTING LIGHT STRUCTURAL SHAPES
SAWING STORE-FRONT AND DISPLAY SECTIONS
TRIMMING GATES ON BRASS, ALUMINUM AND IRON CASTINGS
TRIMMING DIE CASTINGS
SAWING PLASTICS AND MANY OTHER JOBS

"We use this tool for pretty nearly every kind of cutting in our toolroom and experimental shop," reports this superintendent. "Our men cut everything on it, from cast-iron jig and fixture bases 1½" and 2" thick up to draw-die segments 6" thick. And of course it is used for all miscellaneous sheet metal cutting, such as templates, and for structural-shape cutting, parts for experimental machines, and so forth. We honestly don't know how we got along without the machine—and now that we know what a time and money saver it is, we wouldn't give it up for twenty times its cost! And its cost was very low to start with!"



Above, sawing draw-die segments and trimming die castings; Below: sawing light structural shapes. The machine is equally at home on both jobs.

There is no limit to the number of jobs you can find for this economical, low-cost tool around the general tool and machine shop. And the few uses mentioned above scratch only the surface of the machine's adaptability. Die casters find it indispensable for trimming work, and molders of plastics also.



It cuts extruded shapes square, beveled or at any angle for store-front work, and cannot be equalled for fitting light structural shapes. The miter-gage groove in the table makes it easy to fit the machine with fixtures for cutting tubing, etc., on a production basis, and it can be fitted with a rip gage for cutting strips from sheet metal. The ornamental bronze and iron shop can find dozens of uses for it; it cuts felt, asbestos, brake lining, transite, Bakelite and similar synthetic sheets, rods and tubes—once the machine is installed, there is no end to the number of jobs that are found for it!

Users are enthusiastic about its economy, versatility, low power consumption and low upkeep cost.

"Cut Our Trimming Costs 60%"

"We have three of your band saws in our foundry," says one plant manager (name on request). "We use them for sawing gates on our brass and aluminum castings. We figure that we save at least 60% on our trimming costs by the use of these machines, due to their low first cost, their low upkeep, their small blade cost and fine blade life. We don't know where we would find a machine that is so useful. It is indispensable!"

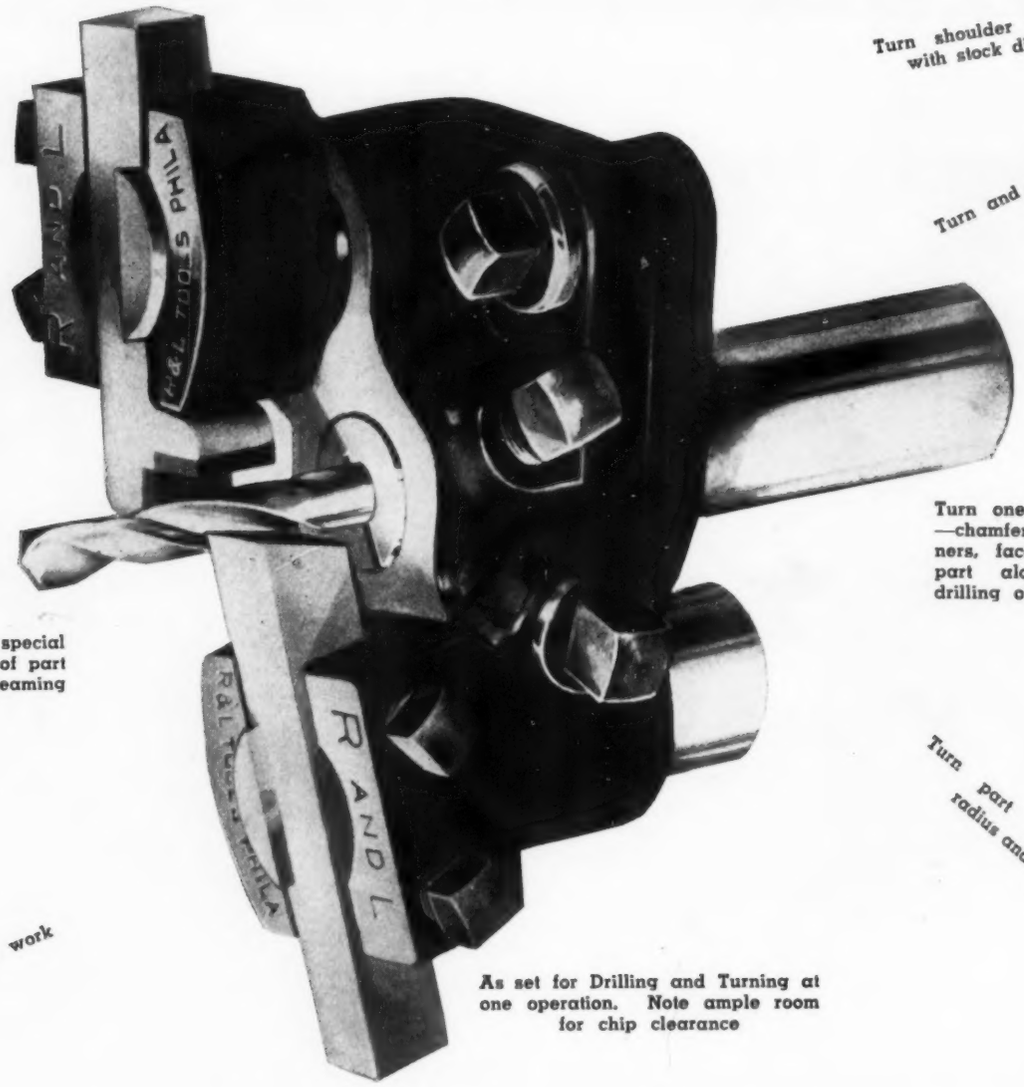
Left: Sawing gates on aluminum castings. Three band saws are used in this foundry, sawing gates on aluminum and brass. The manager reports savings of up to 60% on his trimming costs, using these machines.

DELTA MANUFACTURING CO.

669 E. VIENNA AVE. MILWAUKEE, WIS.

ALL THESE OPERATIONS WITH *ONE* TOOL!

How many tools do you have to have?



Drill and chamfer

Turn two diameters

Turn and form special shape on end of part while drilling or reaming

Point very slender work

Turn shoulder concentric with stock diameter

Turn and center

Turn one diameter —chamfer two corners, face end of part along with drilling or reaming

Turn part with large radius and drill

As set for Drilling and Turning at one operation. Note ample room for chip clearance

R & L COMBINATION TURNING TOOL

It Turns — Drills — Burnishes — Centers

In addition to replacing an assortment of fourteen tools, this New Patented Combination Tool is the only Right and Left Hand Tool on the market. It can be changed from Right to Left in ten seconds and performs two or three operations at once.

May be used for roughing and finishing cuts. Heavy cuts are possible with this tool because thrust is in direct line with the backrest at all times. Finish is excellent, free from chatter marks.

The extremely hard surface of the Tantalum Carbide backrests, or burnishers, make it impossible to pick up the metal and mar the surface of the work with scratches or blisters.

The cutting tool can also be furnished with a Carboloy Tip to take care of difficult metals such as Nickel Alloys, Bronze, Nitralloy and Stainless Steel.

The R & L is a real money-making production tool with hundreds in daily service in leading screw-machine shops.

Write today for full particulars and prices

R and L TOOLS

NICETOWN, PHILADELPHIA, PA.

Accessories

SUPPLIERS of accessory units have played an important part in the development of improved manufacturing facilities during the past year, as in previous years. The cooperation that exists between the manufacturers of major machine units and the suppliers of parts, mechanisms and materials is having a definite beneficial effect on the efficiency of modern production equipment.

Work-holding devices, used in conjunction with major machine units, are undergoing continual development. Chucks, rotary tables and vises account for eleven of the eighteen work-holding devices described in the following pages. One of these is a magnetic chuck of a permanent-magnet type that uses special-alloy magnets. These units are completely sealed so that coolant cannot enter the interior. Removable stop plates at the ends of these chucks can be adjusted vertically to suit requirements of the parts being machined.

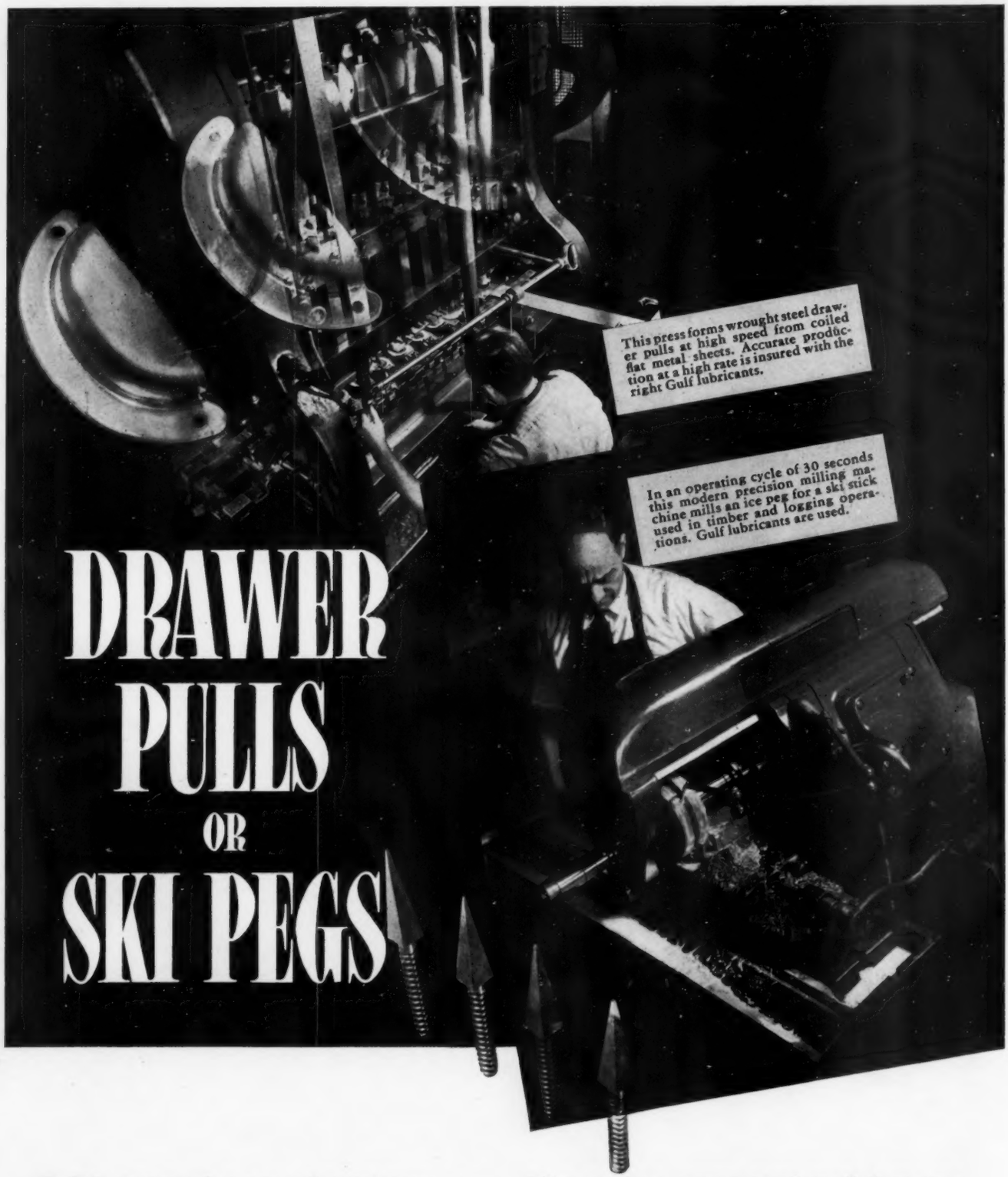
A rotary table, for use with a jig borer, is designed to permit rapid swiveling to approximate position, then a micro-adjustment is engaged and final setting is made by handcrank. It is claimed that holes can be spaced accurately within 0.0002 in. on a 10-in. diameter when using this table.

Several new grinding attachments are offered for special applications, each being designed to supplement standard equipment regularly furnished with production machines. One of these is a radius grinding attachment for use with a cutter grinder in sharpening milling cutters. By using this unit, the face, radius and periphery of the cutter can be ground without removing the cutter from the machine.

Tool-holding attachments, for both standard and special machining operations, offered during the year include a relieving attachment for toolroom lathes, several drill and tap chucks and a small, high-speed milling head that is individually motor-driven. Boring, drilling and milling operations can be performed with this unit.

Grinding heads are offered for use on lathes and planers for both cylindrical and surface grinding operations. One of these is a large unit designed to replace wheelheads on cylindrical grinders to adapt them for automatic-cycle, plunge-cut grinding. This unit is self contained and has rapid traverse, slow grinding feed, dwell or spark out and rapid return, all controlled by one pushbutton. Dynamically-balanced motors are used in practically all of these units.

Coolant pumps and filters are undergoing continual improvement and a number of new and improved units have been made available. The majority of the pump units are self-scavenging and are particularly designed for handling coolant containing abrasive particles.


This press forms wrought steel drawer pulls at high speed from coiled flat metal sheets. Accurate production at a high rate is insured with the right Gulf lubricants.
In an operating cycle of 30 seconds this modern precision milling machine mills an ice peg for a ski stick used in timber and logging operations. Gulf lubricants are used.

DRAWER PULLS OR SKI PEGS

NO matter what type of metal parts you manufacture, your modern machines will perform more smoothly and with greater accuracy if you keep every moving part protected with the right Gulf lubricant.

Today's modern equipment demands better oils and better methods of application. That is why a greater number of plant operators are availing themselves of the services of an experienced Gulf lubrication engineer. He can help you insure maximum efficiency—and lowest maintenance costs—for every machine in *your* plant. Why not avail yourself of this money-saving service?

GULF OIL CORPORATION GULF INDUSTRIAL LUBRICATION **GULF REFINING COMPANY**

Work Holders—Stock Feeds—Tool Holders—Milling Heads—Grinding Heads—Punching Units—Air Cylinders—Coolant Systems and Lubricators—Production Counters & Cycle Timers

Chucks, Magnetic

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 864.)

A magnetic chuck of the permanent magnet type, for sale only in the United States, uses permanent magnets of special alloy which are claimed to maintain several times more energy than permanent mag-

nets previously available. Model 510 has a 5¾x10⅜ in. working surface; magnetic surface, 3¾x 7½ in.; height, 3⅜ in.; length over-all, 12$\frac{3}{32}$ in.; shipping weight, 50 lb. Working surface of Model 618 measures 6⅜x18⅛ in.; magnetic surface, 4½x14$\frac{1}{16}$ in; height, 3⅝ in.; length over-all, 21 in.; shipping weight 104 lb.

Chuck, Indexing, "Super-Spacer"

Hartford Special Machinery Co., Hartford, Conn. (Vol.81, p.264.)

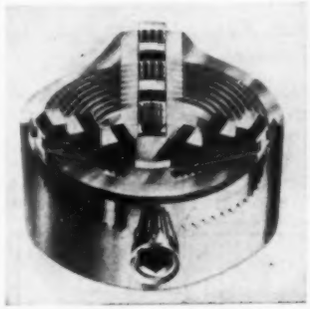
The "Super-Spacer" indexing chuck combines the features of quick setup, rapid indexing, accuracy and adaptability. It consists of a base on which is mounted a flanged turret having a master index plate and provision for mounting mask

plates. A standard steel-body chuck is mounted on the flanged turret and is easily rotated when the clamp handle is released. Specifications: over-all length, 12½ in.; width, 9⅝ in.; height, 7¾ in.; weight, 83 lb. Master index plate has 24 notches. Mask plates with 2, 3, 4, 6, 8 and 12 spaces are furnished.

Chucks, Scroll-Type

George Scherr Co., 128 Lafayette St., New York, N. Y. (Vol.81,p.1116.)

All moving parts of the Taylor self-centering scroll-type chucks are hardened and ground. Spiral is revolved by means of any one of three pinions. Its front face has the



form of a hollow cone and is cut with a spiral V-thread which engages with the teeth cut in the back of the jaws. Three-jaw chucks are available in sizes ranging from 4½ to 20 in. They range in weight from 8¾ to 246 lb.

Chucks, Gear

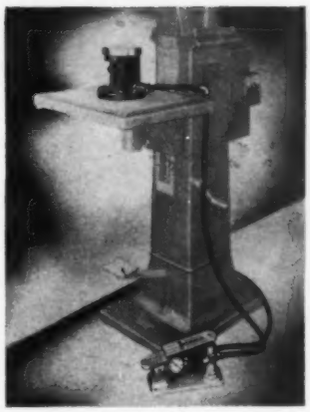
Garrison Machine Works, Dayton, Ohio. (Vol.81,p.424.)

Gear chucks permit accurately chucking assemblies of various kinds. Location is from the pitch line of the teeth of the chucked gear so that the final finishing operations will be concentric with the teeth of the gear.

Table, Rotary

Marburg Bros., 90 West St., New York, N. Y. (Vol.81,p. 891.)

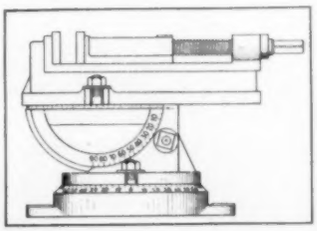
This rotary table, designed for use with the Moore jig borer, has a semi-steel base and a solid forged-steel top. A hardened, ground and lapped bushing is inserted in the center, making it easy to locate a piece centrally on the table. In operation, this rotary table is swiveled rapidly to its approximate position, then a micro-adjustment is engaged and the final setting made by hand-crank. It is claimed that holes can be spaced accurately within 0.0002 in. on a 10-in. diameter.



Jig, Tapping

R. G. Haskins Co., 4630 W. Fulton St., Chicago, Ill. (Vol. 81,p.674.)

The "Air-Jig" has been designed to increase the sensitivity of air-controlled tapping. Tap head of the machine is held in a fixed position and the blanks are mounted on the jig and presented to the tap. An air-operated piston moves the jig table vertically, the movement being governed by pedal control valve assembly.



Vise, Universal, "Multi-Swivel"

Master Tool Co., 137 Oliver St., Boston, Mass. (Vol.81,p. 1239.)

Suitable for use on drill presses, milling machines, shapers, planers or surface grinders, the "Multi-Swivel" universal vise can be swiveled in three directions. Specifications: over-all length, 17⅝ in.; height 11½ in.; maximum jaw opening, with steel plates in place, 4 in.

Vise, Cam

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 870.)

The No. 2 C cam vise is intended for machining duplicate parts. A lever and cam actuate the movable jaw, and the large screw and nut give approximate adjustment for the piece being machined. Specifications: width of jaw, 5½ in.; depth of jaw, 1½ in.; jaw opening, 2 in.

Vise, Knuckle-Action, "Knu-Vise"

Knu-Vise Products Co., 6432 Cass Ave., Detroit, Mich. (Vol. 81,p.717.)

Designed for rapid clamping and releasing parts that are to be drilled, reamed, tapped or milled, the Model 325 knuckle-action vise provides a common base with quick clamping action for drill jigs, the interchangeable jaws being suitable for insertion of jig bushings to suit individual requirements.

Vise, Chain, "Rigid"

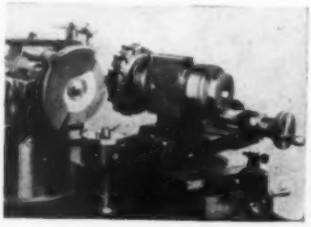
Ridge Tool Co., Elyria, Ohio. (Vol.81,p.813.)

The "Rigid" chain vise includes a pipe rest and pipe bender. Frames are made of malleable metal and jaws of tool steel, hardened for firm grip and long wear. Four sizes—2, 4, 6 and 8 in.

Grinding Attachment, Radius

Cincinnati Milling Machine and Cincinnati Grinders, Inc., Cincinnati, Ohio. (Vol.81,p.1239.)

This radius grinding attachment is designed for use with



the Cincinnati No. 2 cutter and tool grinder. It consists of four principal parts—the swivel housing, which is fastened to the machine table, the swivel table, top plate and the work-head support. Face, radius and periphery of the cutter can be ground without removing the cutter from the attachment. Specifications: capacity, maximum, 12 in. diameter and 1 in. radius; net weight, 145 lb.

Vise and Bender, Pipe, Combination

J. H. Williams & Co., 75 Spring St., New York, N. Y. (Vol.81, p.881.)

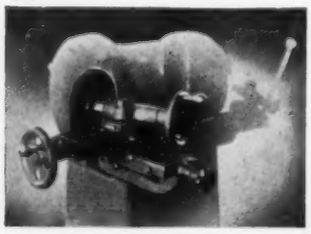
No. V-1 "Vulcan" vise stand combines a chain pipe-vise and pipe-bender. Legs fold for

carrying and are held together by a simple tie chain. Vise has capacity for ⅛ to 2-in. pipe and the bender handles pipe up to ¾-in. diameter. Complete stand weighs 35 lb.

Grinding Attachment, Cutter Disk

Landis Machine Co., Waynesboro, Pa. (Vol.81,p.346.)

This grinding attachment is offered for resharpening cutter disks on any Landis chaser grinder and was particularly designed for regrinding cutter disks used on the Geist roller pipe cutter. The attachment will take disks 6, 7 or 8 in. in diameter.



Grinder, Drill, Improved

Atlas Press Co., Kalamazoo. Mich. (Vol.81,p.1116.)

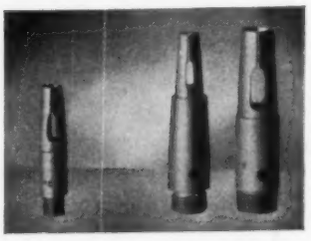
This drill grinding attachment has been redesigned to move the chuck locking screw away from the grinder wheel

and to increase the strength of the attachment. It is adaptable to any grinder and any wheel thickness. Any drill between 3/32 and ½ in. diameter can be sharpened. Chuck and V-block are designed automatically to center the drill. Model W30-40 is recommended for use with 6-in. diameter wheels, while Model W30-41 will clear 7-in. diameter wheels on standard bench grinders.

Fingers, Feed, Type K

Eastern Machine Screw Corp., New Haven, Conn. (Vol.81,p. 342.)

A line of "H & G" fingers for feeding stock on automatic screw machines is now available. Known as Type K fingers,

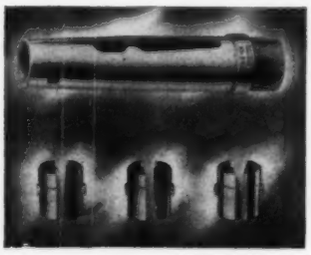


these units are designed so that the same finger can be used on many different makes and sizes of machines. Fingers are designed and proportioned for the size of stock they are to feed.

Fingers, Feed, Master

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 631.)

Round or hexagonal pads of hardened steel, bronze or cast iron are interchangeable in these master feeding fingers for automatic and wire-feed screw

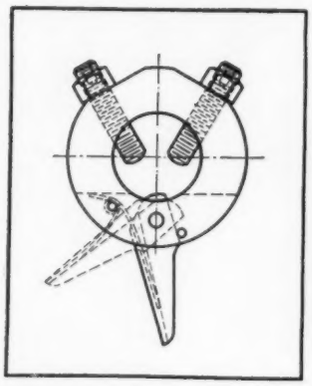


machines. Entire finger is given a spring-temper treatment for tension to hold the pads and stock. Two pads take the wear from the finger and can be interchanged with pads of a different material, size or shape.

Dog, Cam, Grinder

Ready Tool Co., Iranistan and Railroad Ave., Bridgeport, Conn. (Vol.81,p.634.)

This quick-acting-cam grinder dog has been redesigned so that three-point contact is secured

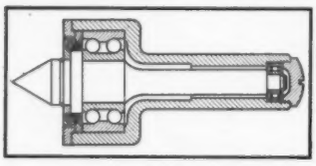


on all sizes of work held in the dog. Setscrews are on a 60-deg. angle, instead of 90 deg. as in the previous design. Sizes range from ¼-¾ in. to 1½-2 in. diameter.

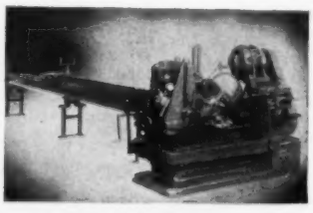
Center, Ball-Bearing Live Spindle

The Ready Tool Co., Iranistan and Railroad Ave., Bridgeport, Conn. (Vol. 81,p.1232.)

This "Red-E" live-spindle type ball-bearing center uses a double-row preloaded angular contact precision bearing in the



front end and a single-row, self-aligning roller bearings in the back. Spindle is of large diameter to prevent deflection at the center point.



Bar Feed for Saw

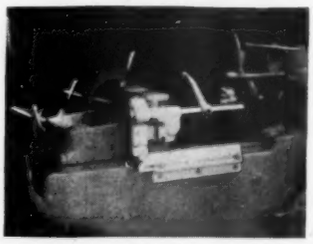
Cochrane-Bly Co., 15 St. James St., Rochester, N. Y. (Vol.81, p.588.)

Special handling apparatus for square and rectangular bars that will grip a bundle of bars on the end and feed them all the way up to a saw blade is shown applied to the No. 55 sawing machine. Fixtures are designed to hold 40, ¼x2 in., or 20, ½x2 in. cold-drawn bars which are supported on rolls and held in the extended carriage. Stock carriage is fed forward by chain and sprocket operated by a crank handle.

Stop, Automatic, Threading Machine

Landis Machine Co., Waynesboro, Pa. (Vol.81.p.902.)

This automatic work shop, designed for use on the "Landmaco" threading machine, may also be applied to all standard Landis threading machines that



employ a Model A carriage front. The unit is fully automatic in action. It may be used to advantage where it is desired to locate stock in the same relative position for threading and it is applicable to operations where the thread is close to a shoulder.

Straightener, Coiled Stock

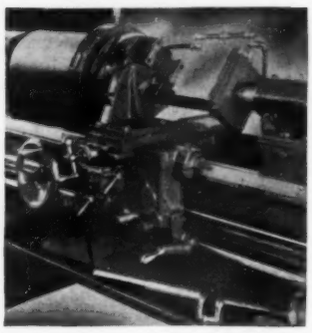
U. S. Tool Co., Inc., Ampere, N. J. (Vol.81,p.1002.)

Power-driven straighteners for heavy, coiled stock are designed for use in conjunction with U. S. automatic coil cradles and slide feeds to provide a means for automatically removing stock from heavy coils, straightening it and feeling accurate lengths to the punch press. Straighteners are available in sizes to handle stock up to ½-in. thick and can be furnished to handle any width stock.

Tooling, Crankshaft, for Engine Lathe

Reed-Prentice Corp., Worcester, Mass. (Vol.81,p.594.)

Tooling for single-throw crankshafts, such as are used extensively in textile machinery, is available for use

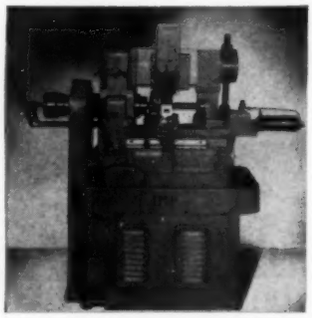


with standard 16 in. lathes. Setup has capacity for shafts ranging from $1\frac{9}{16}$ to $3\frac{1}{2}$ in. diameter, with maximum throw of $4\frac{11}{16}$ in. and minimum throw of $1\frac{11}{16}$ in. Chuck has capacity for $27\frac{3}{4}$ in. length of shaft. Crankpins ranging from $1\frac{9}{16}$ to $3\frac{1}{2}$ in. in diameter can be turned.

Lathe Attachment, Overarm

Seneca Falls Machine Co., Seneca Falls, N. Y. (Vol.81,p.467.)

This third slide or overarm attachment is for use with any of the new style "Lo-Swing Imp" lathes. It may be used

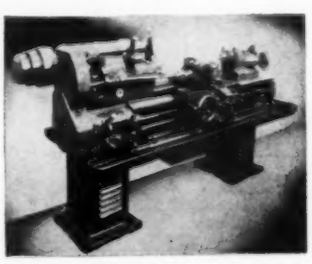


for taking a finishing cut after roughing with tools on the rear slide or for chamfering and similar operations. The slide is heavy enough to be used for roughing operations, if desired.

Relieving Attachment, Toolroom Lathes

R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. (Vol.81, p.587.)

Any required relief from 0 to $\frac{1}{4}$ in. can be obtained with the use of only two cams in this fully-universal relieving attachment. The majority of work within the range of the attachment can be handled with-

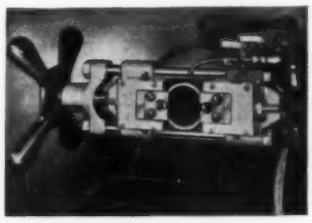


out angularity of the knuckle joints. No supporting blocks or additional knuckle joints are necessary to change from external or internal to end relief. For spiral relief, it is necessary only to make a simple adjustment of the change gear combinations.

Cut-Off Unit, Threading Machine

Beaver Pipe Tools, Inc., Warren, Ohio. (Vol.81,p.634.)

Design of the Model-A pipe and bolt cutting and threading machine has been improved



to provide a choice of wheel-and-roller or automatic-knife cutoff. Machine has a rack-and-pinion feed, uses quick-opening fully-adjustable diskheads and has a $\frac{1}{8}$- to 2-in. range.

Drill Holders, Adjustable, "Micro"

Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich. (Vol.81,p.428.)

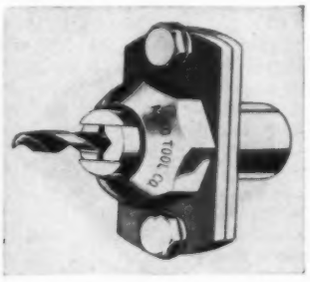
Three lines of "quicklock" adjustable holders for drills, reamers, taps and spot facers

have been improved to increase the strength and accuracy of the units. A slight turn of the locking sleeve locks or unlocks the adjusting nut and a turn of the nut gives a measured adjustment in thousandths of an inch.

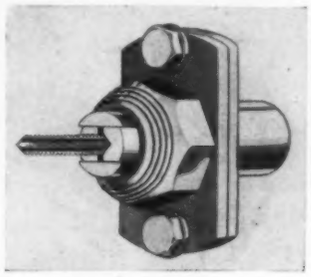
Chucks, Drill and Tap

Alco Tool Co., Bridgeport, Conn. (Vol.81,p.1008.)

Drill chuck and tap holder, either of which will fit any screw machine and requires no bushing. The drill chuck is



adjustable to any size drill within its range. It is full floating and permits concentric drilling. Tap holder has



been tapered to a small diameter and has floating alignment. Both chuck and holder are available in capacities from $\frac{1}{32}$-$\frac{1}{8}$ in. to $\frac{7}{16}$-$\frac{5}{8}$ in.

Chucks, Drill, Keyless

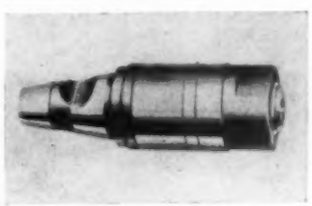
K. O. Lee & Son Co., Aberdeen, S. D. (Vol.81,p.340.)

A line of "Knock-Out" keyless drill chucks adaptable to all types of drilling equipment has been announced. No tools, wrenches or keys are required for the operation of these chucks. The five sizes now available have capacity ranges from 0-$\frac{1}{4}$ in. up to $\frac{1}{4}$-$\frac{7}{8}$ in.

Arbor, Cam-Lock

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p.1058.)

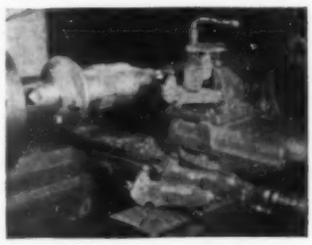
Designed for use with cutter adapters and milling attachment spindles equipped with a cam-type, lock, the cam-lock arbor makes it possible to use certain small milling and other cutters with cam-lock adapters.



Tool Holder, "Lathetule"

H. J. Fausnaugh, 1022 North Main St., Three Rivers, Mich. (Vol.81,p.1228.)

Semi-turret lathe operation on an engine lathe is claimed to be possible with the "Lathetule." This device consists of a quick-acting positive clamping fixture which replaces the tool post. Special tool holders are used, one for each operation. These are claimed to be

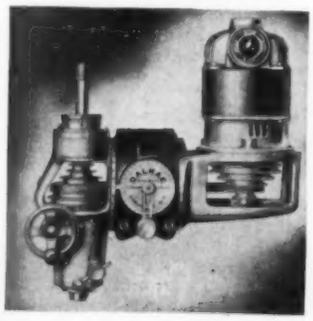


replaced accurately in the same position when changing from one tool to another.

Milling Head, "Speedmill" Midget

Dalrae Tools Co., Syracuse Bldg., Syracuse, N. Y. (Vol. 81,p.465.)

Boring, drilling and milling operations can be performed with the "Midget" Speedmill. High-speed spindle of this unit is housed in a hardened and



ground quill which has a $2\frac{1}{2}$ in. travel. Boring and drilling feeds are obtained with worm and worm-wheel. The usual solid depth stop is replaced by a stop that "clicks" a warning when the desired depth is reached. This unit retains many of the features of the standard Speedmill. These are flywheel-type pulley and single mounting for any compound angle.

Grinding Head, Lathe, "Bowgage"

Fitchburg Grinding Machine Corp., 76 Winter St., Fitchburg, Mass. (Vol.81,p.465.)

The "Bowgage" independent wheelhead unit is designed to replace wheelheads on grinding machines to adapt them for automatic cycle grinding. This is a self-contained independent unit having rapid traverse, slow grinding feed, grinding dwell or spark out and rapid return to starting position, all

controlled by one pushbutton. Specifications: wheel spindle diameter, 3 in.; rapid traverse movement, 0 to 5 in., fixed at the factory; automatic grinding cycle, adjustable from 5 sec. to 30 min.; motor required, 3 to 10 hp. depending on wheel size; weight, 1,650 lb.

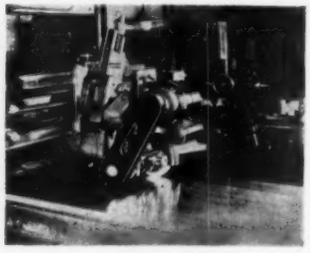
Rate of grinding feed is adjusted by a hydraulic metering valve through a dial on the panel. Dwell time is governed by a clock-controlled time delay switch. Another graduated dial operated by a small handwheel can be set for the amount of stock removal. Minimum is $\frac{1}{8}$ in. on the diameter.

Wheel feed is obtained by a toggle action controlled by the movement of a leaf spring. Hydraulic flattening of the leaf spring by a vertical movement elongates the spring. This results in forward movement of the wheelhead. The head is built for either right- or left-hand wheel mounting, and the unit can be mounted anywhere on the machine.

Grinding Head, Lathe, No. 12 "Chief"

Dumore Co., Racine, Wis. (Vol. 81,p.802.)

The 1-hp. capacitor motor used on the No. 12 "chief" lathe grinder is dynamically balanced to eliminate vibration and chatter marks. Power is transmitted to the quill by two



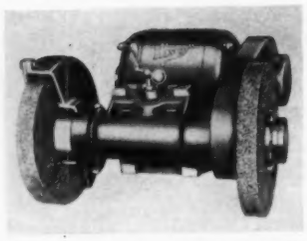
V-belts, and belt tension is secured by sliding the motor on the base and tightening four capscrews. Six sheaves are furnished so that spindle speeds of 2,800 to 8,200 r.p.m. are available for delivering correct speeds for 8 to 3-in. wheels.

The quills are designed for horizontal operation. For vertical work of a production nature, a special quill is available. The external quill has a wheel capacity of $3\frac{1}{4}$ to 8 in. and is built for heavy work. The five internal quills will grind holes $2\frac{3}{8}$ in. and larger to depths from 8 to 24 in.

Grinding Head, Lathe, Precision, 2-Wheel

The Hisey-Wolf Machine Co., Cincinnati, Ohio. (Vol.81,p. 1230.)

Made in six sizes, ranging from 1 to 10 hp., and arranged for wheels from 8 to 20 in. diameter, these two-wheel,

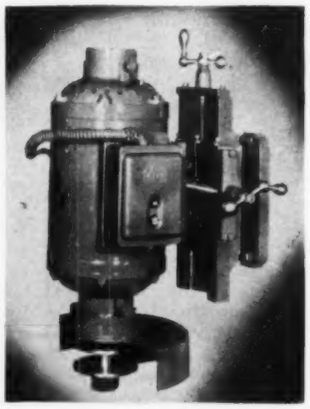


wide-range precision lathe grinders are claimed to be adapted for grinding rolls where end space is limited. The same wheel can be transferred from one end to the other, or two wheels can be used. All units are powered by dynamically-balanced a.c. or d.c. motors. A dovetail slide with screw feed affords rapid adjustment of the wheel to the work. Direction of rotation of the grinding wheel is reversible by reversing the motor.

Grinder, Vertical, Angle-Plate

Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio. (Vol.81,p.424.)

This vertical angle-plate grinder is designed for attachment to machine tools and can be furnished with horizontal or vertical feed, or both. Motor operates at 3,600 r.p.m. when



using a 6-in. cup wheel. Motor size ranges from 2 to 10 hp. The larger units may be had with motors operating at 1,200 or 1,800 r.p.m., depending on the diameter of wheel to be used.

Quills for Grinder, Internal

Dumore Co., Racine, Wis. (Vol. 81,p.346.)

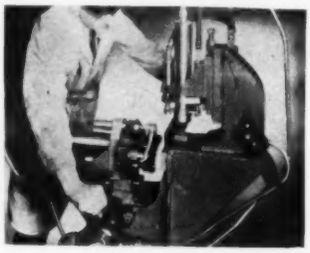
Three new quills are available for use with No. 7 grinders. The upper quill shown is known as the "P" quill. It is equipped with a $\frac{1}{4}$-in. chuck

and a sleeve collet of $\frac{1}{8}$-in. capacity and is for grinding small internal holes of diameters less than 1 in. to a depth of $1\frac{1}{4}$ in. Lower quill is the "N-6", which is capable of grinding a hole $\frac{1}{16}$ in. in diameter to a depth of 6 in. The "N-5" quill is equivalent to the "N-6" unit, except that its maximum depth of grind is 5 in.

Punching Units, Hydraulic

Progressive Welder Co., 737 Piquette Ave., Detroit, Mich. (Vol.81,p.631.)

Self - stripping, hydraulic punching units can be used in place of cam dies and can be positioned to accommodate curved or irregular parts. Each



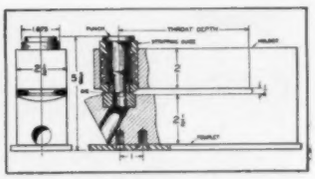
unit will punch one or a group of holes in one movement and will accommodate up to No. 11 gage sheet. Hydraulic stripper positions the work against the die before punching and releases it only after the punching cycle is completed. This stripper is claimed to prevent distortion of the material and to insure clean, accurate holes. Punching units can be mounted in groups in fixtures and are easily changed to accommodate variations or revisions.

Units are connected to a master control valve which, with a single movement, starts the punching operation. Clamping devices are used for holding large irregular parts. Hydraulic pressure is supplied by an electrically driven hydraulic pump. The units are fitted to accommodate standard interchangeable punches and dies.

Dies, Perforating, Wales Universal

Strippit Corp., 1559 Niagara St., Buffalo, N. Y. (Vol.81,p. 218.)

Wales universal perforating dies units have capacity for a maximum punch diameter of 0.875 in. for 16 gage steel. Holder width is $2\frac{1}{2}$ in. and throat depth can be 3 to 24 in. as required. The die units are designed for mounting on layout templet with flat head screws. T-slotted plates for use with Wales adjustable dies are adaptable for work involving small quantities. They are available with outside dimensines ranging from $25\frac{1}{2}$x$25\frac{1}{2}$ in.



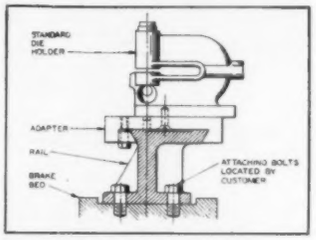
to $55\frac{1}{2}$x$67\frac{1}{2}$ in. Die space ranges from 18x18 in. to 48x60 in.

A redesigned series of piercing units is available for the $1\frac{3}{4}$ and 2 in. Wales holders. The stripping guide is the same for all punch diameters in each holder width, making it necessary to change only the punch, guide button and die when another hole size is desired.

Die Units, Press-Brake

Strippit Corp., 1559 Niagara St., Buffalo, N. Y. (Vol.81,p. 146.)

Wales standard adjustable piercing or notching dies can be mounted on press brakes by attaching adapters to the die holders. A special rail is required to accommodate the adapters to the die holders. Adjustable stops are available for mounting on the rail to locate work in the die unit. A line of piercing dies for angles

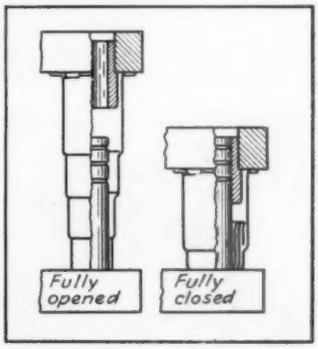


and shapes in which the holder width is $\frac{3}{4}$ in. is available for a maximum punch diameter of $\frac{5}{32}$ in., with a capacity for $\frac{1}{8}$ in. aluminum alloy or steel. The die shoe can be machined to fit the press brake on which the die units are to be used.

Covers, Protective, Leader-Pin

The Wiesman Mfg. Co., Fourth and St. Clair Sts., Dayton, Ohio. (Vol.81,p.1235.)

Designed with a telescopic action, which eliminates any



open space between the pin and the female die, these leader-pin covers serve to eliminate personal accidents and to keep chips and dirt away from the pin and bushing. Covers are made in single, two, three and four units. Units can be furnished in any length from 1½ in. up and in combinations to cover pins on long stroke presses.

Top units are used singly when only the opening between the pin and bushing is to be covered. To cover the pin fully the top unit and a number of reducing units are used. These reducing units telescope within each other and the top units to give the protection desired. Flanges on the top units are cut out and provided with springs to permit easy removal or mounting on the die.

Cylinders, Air, Series LO

Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill. (Vol. 81,p.758.)

Series LO heavy-duty air cylinders have a mirror finish bore that is claimed to be straight, round and concentric.

Flanges are screwed on and then welded to the cylinder body. Standard sizes, up to 16-in. bore, for any length stroke and for air pressures up to 250 lb. are available. Heads are cast steel and are available with or without air cushions at either or both ends.

Pump, Coolant, Centrifugal, No. 206

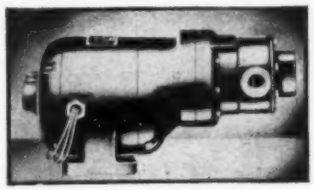
Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 1295.)

Centrifugal motor-pump No. 206 is claimed to be particularly suited for supplying coolant where dirt or abrasives may be present in the liquid. It is designed for a moderate volume of flow at a low head. This pump is fitted with a fully inclosed motor having grease-sealed ball bearings. Stainless steel shaft is integral with the motor and the impeller is of the open or non-clogging type. This unit is designed to be mounted in a tank. Discharge opening is ¾ in. pipe size.

Pump, Coolant, "Motorpump," Rotary

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 592.)

Rotary geared "Motorpumps" are now made to run in one direction only, either right- or left-hand. Pumps No. 101, No. 102 and No. 103 are available with 3-phase motors, both in

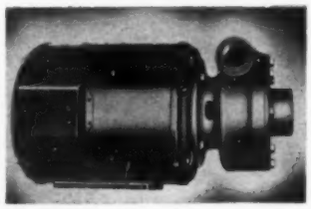


220 and 440 volts, 60 cycle, in addition to previous listings. Similarly, the No. 204 unit is now furnished with a 3-phase, 50-cycle, 220-volt motor. A mechanical seal is now used in place of the packing employed in the previous design.

Pump, Coolant, Horizontal

Pioneer Engineering & Mfg. Co., 8316 Woodward Ave., Detroit, Mich. (Vol.81,p.594.)

This open-impeller type horizontal pump, designed for coolants and lubricants, is



direct-connected to a ball-bearing, moisture-proof electric motor. Although normally installed in a horizontal position, this type of pump may be set vertically.

Pump, Coolant, "Sure Flow"

Logansport Machine Co., 906 N. Market St., Logansport, Ind. (Vol.81,p.1058.)

Made in ten sizes, with capacities ranging from 4 to 150 gal. per min., the Logan "Sure-Flow" pump is available with

direct motor drive, with stub-shaft adapter for vertical power take-off and with belt drive. These pumps are claimed to be inherently self-priming and no part of the pump need be submerged. Impeller is semi-scavenging.

Three styles of mounting are available. These are: standard horizontal base, vertical mounting bracket type, and flange-type base for close mounting in a vertical plane. Drive shaft and bearings are protected from the liquid by rotary seals. The units are compact and self-contained, and no special provisions for mounting are necessary.

Pump, Coolant, Centrifugal

Goulds Pumps, Inc., Seneca Falls, N. Y. (Vol.81,p.811.)

This compact, vertical, submerged-type centrifugal pump is built in the ¾-in. size only and is designed especially for the circulation of coolant, cutting compounds, or similar

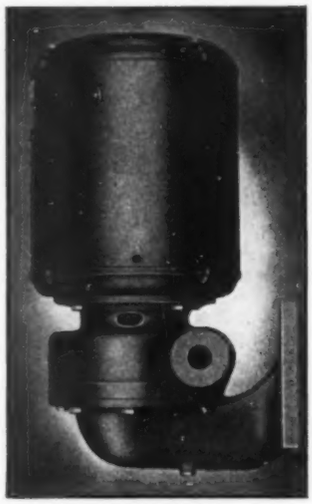
liquids containing abrasives in suspension. Impeller is mounted directly on the extended motor-shaft. Pumps are available in capacities up to 30 gal. per min. and with heads up to 19 ft.

The pump casing is cast integral with the motor support, at the top of which the motor is held in position with a male and female lock to insure alignment. Impeller is of the open double-suction type, and is hydraulically balanced to eliminate end thrust. Clearances between impeller and casing are such as to remove any possibility of binding from chips.

Pump, Coolant, Type VB

Pioneer Engineering & Mfg. Co., 31 Melbourne Ave., Detroit, Mich. (Vol.81,p.757.)

Type VB vertical-bracket coolant pump bolts directly to the side of the machine-base or coolant reservoir. No suction piping is required, as the intake is directly through the base bracket. Relief or bypass



valves are not needed in the delivery line. Any degree of throttling may be had without increasing the load on the motor.

The pump and motor assembly is a self-contained unit which may be dismounted by simply removing the flange bolts. Any type of liquid, not too highly corrosive or viscous, can be pumped.

Purolator, for Grinders

Motor Improvements, Inc., 365 Frelinghuysen Ave., Newark, N. J. (Vol.81,p.382.)

Designed especially for use in filtering the coolant used on grinders, No. G-100 Purola-

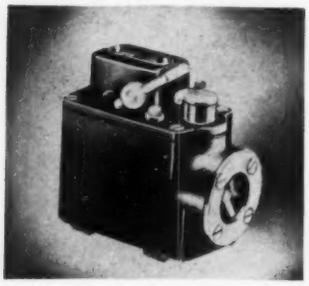
tor is claimed to keep the coolant free from all grit and permit the grinding of mirror-like finishes. Filtering element is submerged in the coolant either in a sump supplied as part of the Purolator or in a container provided by the user. The G-100 unit will handle approximately 18 gal. per min.

A motor-driven impeller-type pump, in a housing inside the filtering element, draws the coolant through the interstices of the filtering element and up through the pump housing to the work being ground or cut. A part of the fluid stream is diverted and forced against the inside surface of the filtering element to keep the surface clean. The unit can be used in any tank 10 or more inches deep.

Lubricator, Automatic

Bijur Lubricating Corp., 22-08 43rd Ave., Long Island City, N. Y. (Vol.81,p.674.)

Having a reservoir capacity of ¼ pint, the Type "L" automatic lubricator is suitable for application on small machines. On release of a lever, a metered quantity of oil is discharged under action of the piston-return spring. Piston stroke may be set to give a total oil delivery of from 2 to 30 drops as desired.

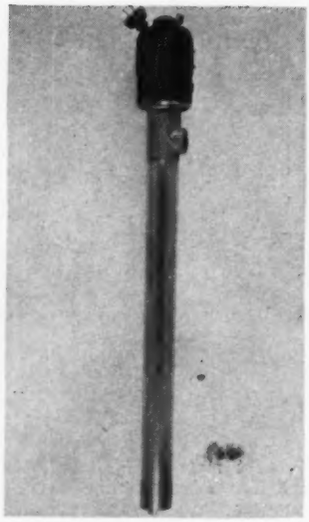


Pump units are supplied with or without reservoirs. A single line of tubing leads from the pump, and junction fittings permit branching at any point to suit the layout of the machine. A pressure of about 50 lb. is developed in the system and distribution of oil to the various bearings is effected by the use of "Meter Units." The Type L lubricator measures 2x3½x3½ in.

Oilers, Automatic, "Sentinel"

Trico Fuse Mfg. Co., Milwaukee, Wis. (Vol.81,p.1239.)

"Sentinel" constant-level oilers are designed for automatically maintaining an accurate level of oil in ring and ball bearings of motors, line shafts, pumps and other equipment having oil wells. It is claimed that no attention is required after the unit is installed, except to fill the reservoir periodically. Four sizes are available.



Pump, Barrel

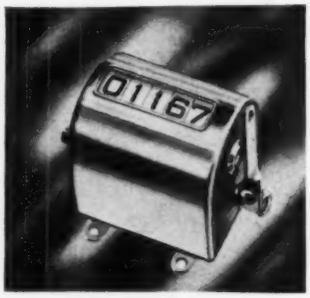
The Stanley P. Rockwell Co., Inc., 296 Homestead Ave., Hartford, Conn. (Vol.81,p. 1295.)

Designed to empty metal oil barrels by inserting through the large side bung hole, this barrel pump has a capacity ranging from 10 to 20 gal. per min., depending upon the viscosity of the oil. Standard motors are wound for 110 volt service, either a.c. or d.c. Length is 31 in. and weight is 11 lb. Outlet is tapped for 1-in. pipe fittings.

Counter, Mechanical, Type SMC-1

Production Instrument Co., 1325 S. Wabash Ave., Chicago, Ill. (Vol.81,p.264.)

Type SMC-1 mechanical stroke counter will record up to 99,999. Overall dimensions of this counter are ⅞x1½x1¾ in.

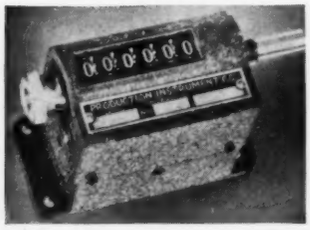


It is claimed that skips or overthrow of number wheels is effectively prevented. Counter is of the non-reset type.

Counters, Mechanical

Production Instrument Co., 1325 S. Wabash Ave., Chicago, Ill. (Vol.81,p.869.)

Type MC-3 W mechanical counters have six large legible number wheels, and are arranged for shaft drive. Count advances one number for each turn of the shaft and generally

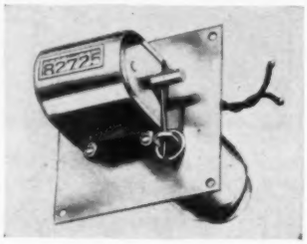


subtracts for each reverse revolution of the shaft. The reset knob returns all number wheels to zero with one revolution of the reset. Specifications: length, 3⅝ in.; height, 2⅜ in.; width, 1¾ in.; diameter of mounting holes, 3/16 in.

Counters, Electric, Type S.E.C.

The Production Instrument Co., 1325 S. Wabash Ave., Chicago, Ill. (Vol.81,p.1007.)

Type S.E.C. electrically operated counters are equipped with large number wheels having black figures on a white background. Five number



wheels give a capacity of 99,999, which is ample for most requirements in small counters. Operating relay actuates the lever arm of the counter. These counters measure 1⅞x1½x1¾ in. and are mounted on a 2¼ in. square plate. The operating relay is attached below the base plate and extends 1⅞ in. below the surface.

Counter, Electric

Guardian Electric Mfg. Co., 1621-27 W. Walnut St., Chicago, Ill. (Vol.81,p.585.)

A solenoid-operated counting unit, capable of handling up to 400 impulses per min. without overheating or sticking, designed for operation at 6 to 110 volts d.c., and 24 to 220 volts d.c. and is available with standard five-figure, Veeder-Root counters of either the reset or non-reset type. Mechanism is inclosed in a case for protection against dust and dirt.

Production Timers, "Chronologs"

National Acme Co., Cleveland, Ohio. (Vol.81,p.632.)

The Model M Chronolog shown is one of two new models. It may be applied to any machine, process or operation to count items produced and how many minutes the machine was in operation, the

number and extent of all interruptions and the reason for these interruptions.

A counter visible through the large window at the left registers the number of units produced. When there is an interruption at the machine, the operator turns the knob at the left to a symbol indicating the reason for the interruption. This is then registered on the tape. When production is resumed the operator pushes a button on the front of the instrument and the time is printed on the tape. Quantity produced and the time are printed on the tape every ten minutes.

Model O Chronolog has only one set of digit wheels. These may be arranged to count idle time or units produced. It also carries a tape roll which automatically prints every ten minutes, or printing may be secured at any time by inserting a card.

Cycle Timer, "Production Guide"

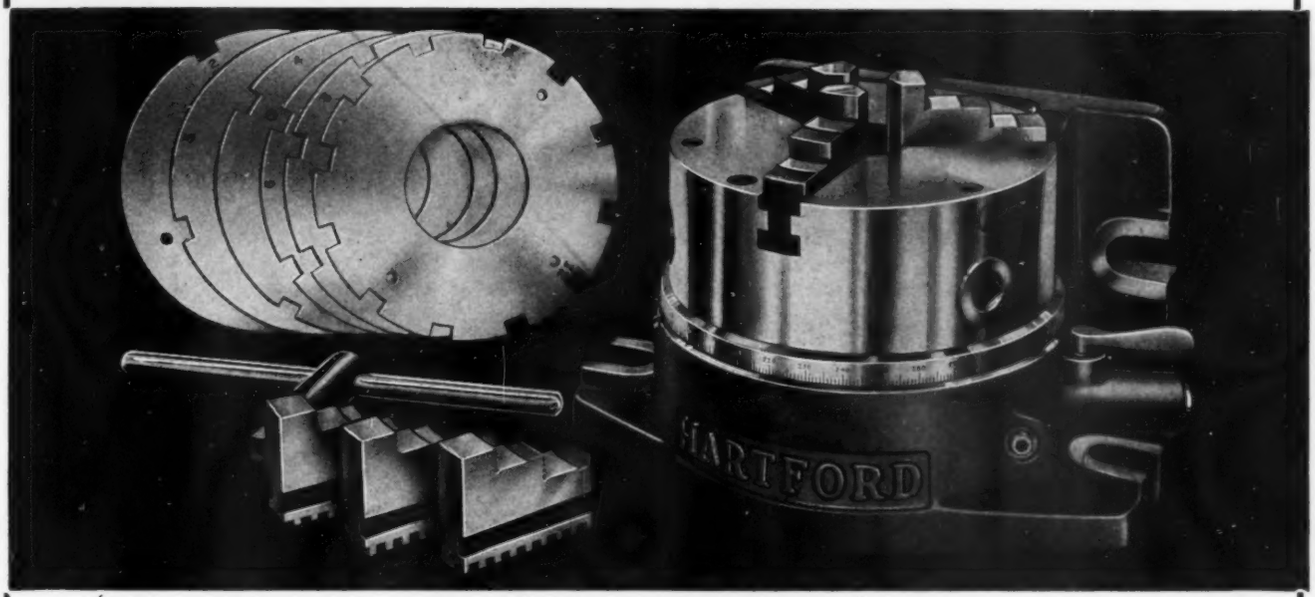
Production Instrument Co., 1325 S. Wabash Ave., Chicago, Ill. (Vol.81,p.146:)

This precision timing device is adaptable for timing repeated operations or manufacturing processes. Various speeds can be arranged and any proportion of loading time and working time can be worked out. A solenoid-operated release for machine control can be provided in addition to the signal light or bell for which the instrument is designed.

The device can be adapted to regulating any repeated operation, where it is desirable to provide a definite and uniform timing of certain portions of the operation.

INTRODUCING

THE HARTFORD "SUPERSPACER"

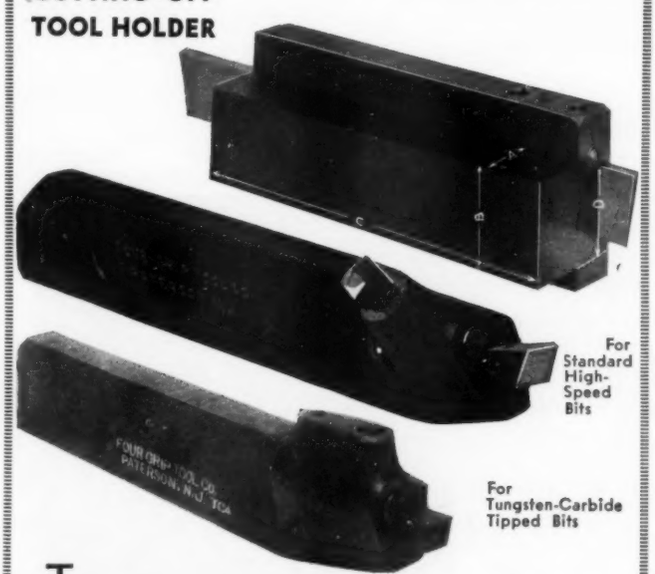


A new spacing fixture, featuring extreme ACCURACY, utmost RIGIDITY, wide ADAPTABILITY, and a unique method for Rapid Errorless Indexing for all divisions within its range.
Circular upon request.

THE HARTFORD SPECIAL MACHINERY CO. HARTFORD, CONN.

"FOUR GRIP" CUTTING-OFF TOOL HOLDER

UNIVERSAL TURRET MACHINE



For Standard High-Speed Bits

For Tungsten-Carbide Tipped Bits

THE FOUR GRIP is the most efficient and practical RIGID TOOL BIT HOLDER. Holds the bit on four sides. Long or short bits can be used, making a solid mass of bit with holder. Eliminates bit breakage. Holds bits that cannot be used in other holders. Quickly pays for itself. Guaranteed against defective material and workmanship.

FOUR GRIP TOOL CO.

109 East 17 St. Paterson, N. J.

VISE

For DRILL PRESS

With and Without Jig Attachments.
Jaws 6", 9" and 12" Long
Often used on Miller, Shaper, Planer

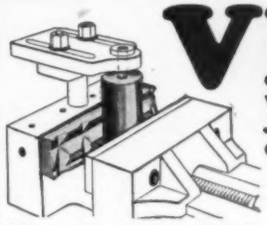


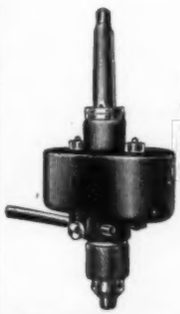
Fig. 3. V-Jaw for Round Work

Attachments mean much drilling — small Jig cost.

Fig. 2 Without Jig Attachments

DRILL

SPEEDER



or High Speed Drilling Attachment
Drives Small Drills up to Proper Speed
INCREASE THE SPEED 3 TIMES
Suits Straight or Taper Shank Drills up to ½" with Speeds to 3,000 R.P.M. For use in Drillers from 20" to largest Radial.

KNURL HOLDER

Swivel Lugs

Shank made to suit turret

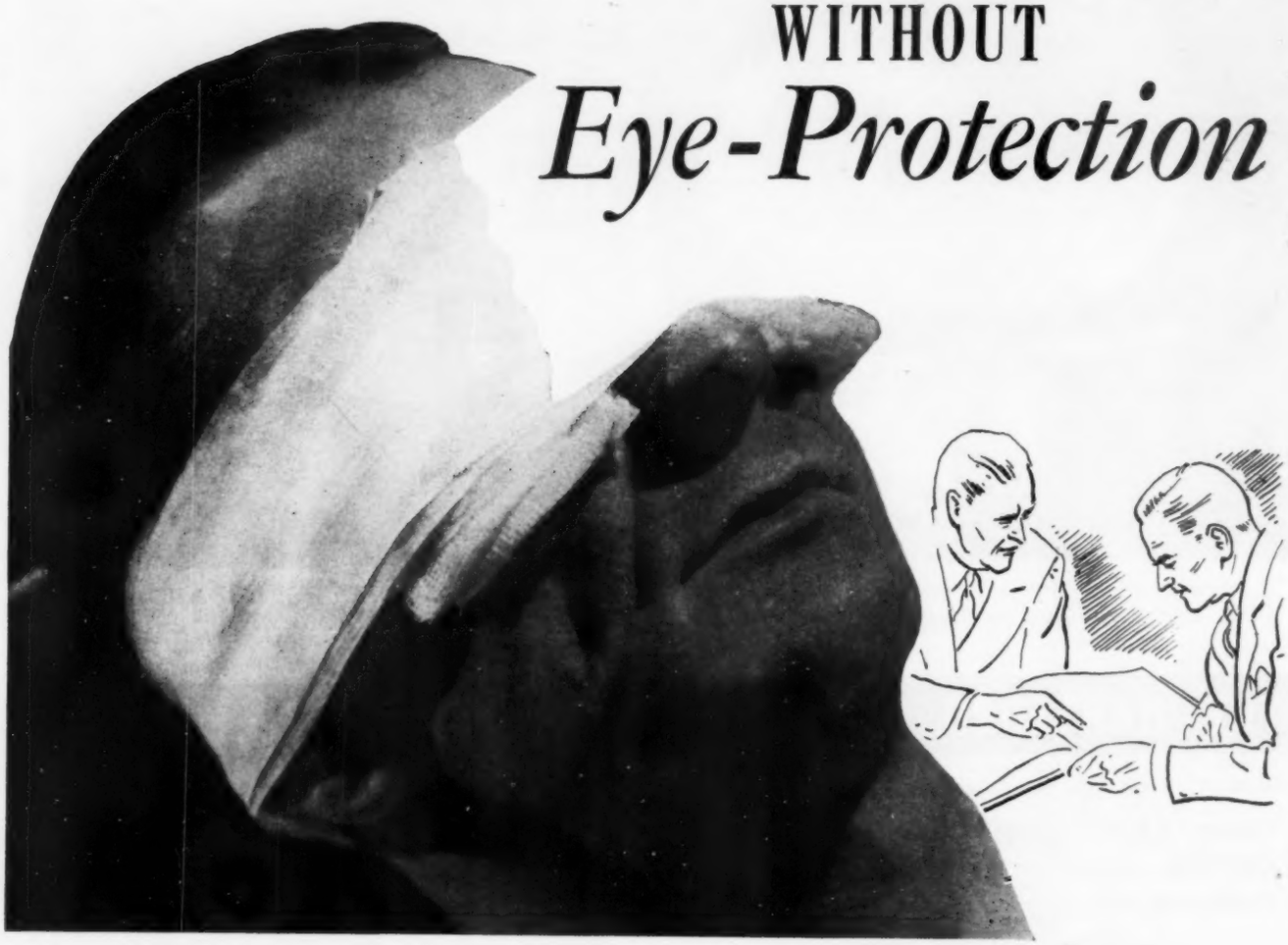
For Turret Lathes
Operates like screw Die
Adjustable to any size within its capacity.

TWO SIZES--TWO STYLES
Straight Cut Knurls in Swivel Lugs Produce all Standard Knurling.

Send for Circulars

THE GRAHAM MFG. CO., 73 Willard Ave., PROVIDENCE, R. I.

THERE'S NO *Cost-Control* WITHOUT *Eye-Protection*



GIVE YOUR MEN *American Optical Goggles*

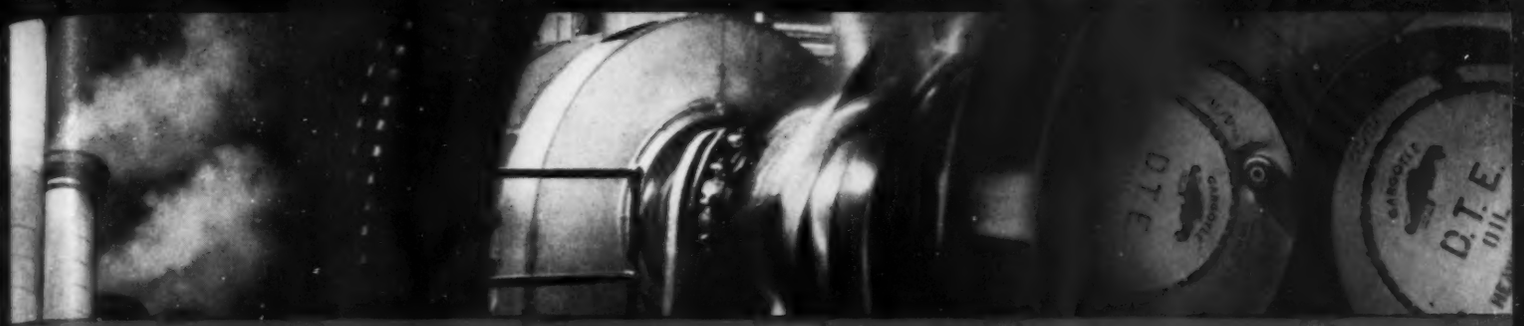
As long as a single endangered eye is allowed to go unprotected, your books are wide open to sudden entries that can't be measured or controlled. Sooner or later that eye will appear on the lost-time sheet. And even though the injury is slight, *its cost is always enormously out of proportion to the cost of the goggles that would have prevented it.*

So it is plainly the soundest sort of business to post *goggles* in your books instead of *eyes*. For goggles are competent comptrollers of company costs . . . keep eyes safe and on the job. Start action now on your eye-safety program for 1938. Don't delay . . . for eye-injuries strike every 36 seconds . . . and some may strike in *your* plant. Call in your neighbor, the American Optical representative. Have him submit a complete eye-protection plan for each man and his job.

F-3100 Ful-Vue Goggles (patented) are cool, comfortable, good-looking. High endpieces remove "blinders" to side-sight. 6-Curve Super Armorplate Lenses (patented) provide far more impact resistance than standard lenses.

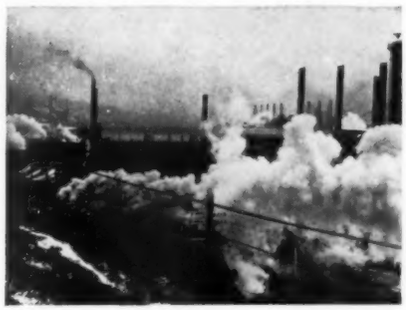
AMERICAN OPTICAL COMPANY

Manufacurers, for more than 100 years, of products to aid and protect vision. Factories at Southbridge, Mass. In Canada, Consolidated Optical Co., Ltd. Branch Offices in all principal industrial centers.



Lubrication Engineering

Here's the Idea



Sure, there are lots of good lubricants on the market. But "Correct Lubrication" makes machinery earn its biggest profit. That's where Lubrication Engineering comes in.

This Reason

Socony-Vacuum's Oils and Greases are engineered to the job. They've got something you can't get elsewhere—72 years' experience—the greatest in the oil business.

Built on Facts

Your operating problems are different? We know it! That's why trained Socony-Vacuum Engineers put their finger on places where Lubrication Engineering will save money.

Works This Way

There's plenty of engineering data! Socony-Vacuum's lubrication library contains scientific facts about oil and machine efficiency. This is the basis for Lubrication Engineering.

In Your Plant

Your best men will quickly okay Lubrication Engineering. It's proved good business to let Socony-Vacuum Engineers and your skilled men work out your problems together.

This First Step

Talk with the Socony-Vacuum Representative when he calls. Get him to tell you about Lubrication Engineering. Show you how it makes for greater efficiency and bigger profits.

SOCONY-VACUUM OIL CO., INC.

STANDARD OIL OF NEW YORK DIVISION · WHITE STAR DIVISION · LUBRITE DIVISION · MAGNOLIA PETROLEUM COMPANY
CHICAGO DIVISION · WHITE EAGLE DIVISION · WADHAMS OIL COMPANY · GENERAL PETROLEUM CORPORATION OF CALIFORNIA

MAKERS OF MOBILGAS · MOBILOIL · GARGOYLE INDUSTRIAL LUBRICANTS

GARGOYLE Lubricants

THE NEXT PAGE WILL HELP YOUR MEN

HOW TO SAVE GRINDS AND BOOST CUTTING HOURS

Socony-Vacuum's Cutting and Soluble Oils will help to improve both the quantity and quality of work done. They will give much longer tool life and lower unit production costs

FOR HIGH-SPEED automatics or precision work, Socony-Vacuum's Cutting Oils are most economical. They have the high, extreme-pressure properties required for machining hardened alloy steel. They are made lighter for machining of fast-cutting screw stocks, low carbon steels.

You can see the savings on your balance sheets. These Socony-Vacuum Oils cut dollars off the "cost" side...add them to your profits!

Especially for Today's Needs

Socony-Vacuum's Cutting Oils have been adjusted to meet the cutting pressures and rubbing speeds encountered today. This extreme pressure value minimizes frictional heat and the wear of cutting tools. Their exceptional lubricity aids in securing a high quality of finish. Even in shops where further savings were thought impossible, the use of Socony-Vacuum Cutting Oils has resulted in surprising economies.

Determining Absolute Machinability

Socony-Vacuum has developed a scientific guide to the selection of correct cutting and soluble oils for every metal cutting operation. This is called S-V Machinability Index. It will give you a uniform basis for comparing the relative machinability of all classes of metals. It will enable you to determine accurately the machinability of any new metal before putting it in a machine.

Scientific Helps for Machine Tool Men

In addition to this valuable new S-V Machinability Index, Socony-Vacuum offers you, without cost, other valuable helps. The picture below shows some of them. They are yours for the asking. Just address the nearest Socony-Vacuum office.

He is a Good Man to Know

The Socony-Vacuum Representative calling at your shop can help you in many ways. One of the best methods for using the vast experience of this organization on your individual problems is to let him work with your men. You will quickly see results that mean additional profits from every operation.

SOCONY-VACUUM OIL CO., INC.

STANDARD OIL OF NEW YORK DIVISION · WHITE STAR DIVISION · LUBRITE DIVISION · MAGNOLIA PETROLEUM COMPANY
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Mobilgas Lubricants

No. 206
—a new Centrifugal Motorpump

Modern design—with fully enclosed motor and grease sealed ball bearings. Specifications on request.

Brown & Sharpe Mfg. Co.
Providence, R. I., U.S.A.

BROWN & SHARPE PUMPS

B·S

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90 LEADING MACHINE TOOL BUILDERS SPECIFY RUTHMAN GUSHERS BECAUSE

for ONE thing . . .

THE CONDUIT BOX IS BUILT-IN

MODEL T L

No other type of design provides so COMPACT a unit as GUSHER vertical construction. Even the conduit box is built-in to save space and permit its use where bulky units would not fit. The simple, compact design of GUSHER Pumps contribute to long life and uninterrupted service. There are fewer parts to wear out and give trouble. Get all the facts. Send for our catalog.

Consider a few more of our
"19 REASONS WHY"

Full ball bearing design • Simplicity of construction • Split second starting • No metal-to-metal contacts • No strainers necessary • Full year's unconditional guarantee.

THE RUTHMAN MACHINERY CO.
CINCINNATI, OHIO
"Standard and Special Pumps for Every Job!"

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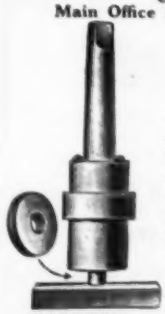
New York, 200 Broadway; Boston, 830 Old South Bldg.; Chicago, 6047 No. Tallman Ave.; Main Office and Works, Stapleton, Staten Island, N. Y.



POSITIVE

AUTO-OPENING STUD-DRIVERS

For Non-Reversing Drills

The jaws open Automatically and release the stud [just like an opening die] without stopping or reversing the machine. The ability to automatically open the jaws by the slipping of the friction, offers a new field for setting every variety of screw-stud, etc.

QUICK-RELEASE REVERSIBLE STUD-DRIVERS *for* REVERSIBLE DRILL

POSITIVE

FRICTION

POSITIVE

FRICTION

We Cover every Variety of Stud-Driving by Simplest and Quickest Method.

Morse Taper,—or Hex Shank for Electric Drill.

Save...
ON METAL HOSE
—new welded steel construction lowers cost

Seamless Type STEEL HOSE

● Exclusive process makes welded steel hose available where seamless type is required. Where use of steel hose is practical—and there are plenty of places where it is—Rex-Weld (RW-81) Steel Hose fills the need at lower cost. Fabricated by exclusive process of one-piece, jointless, balanced strength construction. For applications requiring bronze, Rex-Weld (RW-81) Welded Bronze Tubing is recommended. Send for sizes and prices. Chicago Metal Hose Corporation, Maywood, Illinois (Chicago-Suburb).

REX-WELD *Flexible* METAL HOSE

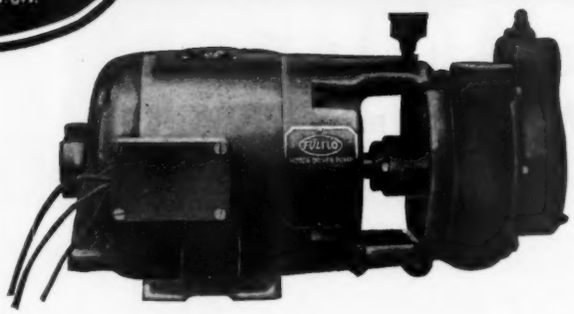
CENTRIFUGAL "FULFLO" COOLANT PUMPS

TRADE MARK "FULFLO" REG U.S. PAT. OFF.

FULFLO COOLANT PUMP

Improved Construction Defies Grit and Chips

Here, at last, is a coolant pump which meets *all* requirements of the machine tool industry at low first cost—with still lower operating and maintenance costs. Quiet, dependable, efficient performance is assured by the following improved features.



• SPECIFICATIONS •

Centrifugal Pumping Action assures constant flow of cooling solution at all times—regardless of grit and chips.

No bearing in pump to wear out. Hollow steel pump shaft slips over motor shaft—inexpensive and easily replaceable.

Spring-tension Packing eliminates adjustments and prevents leakage.

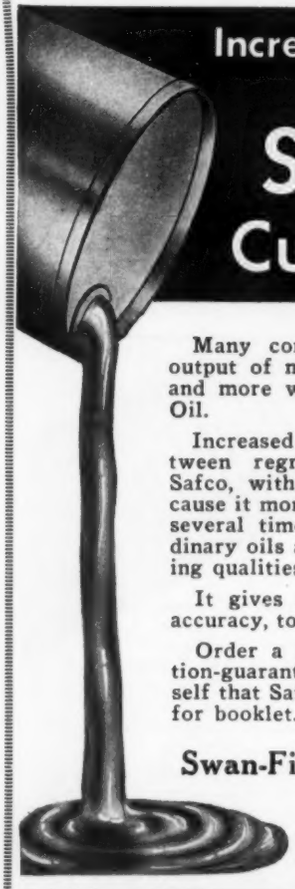
Capacity ranges from 10 to 70 gallons per minute with 10 ft. head, depending on size of motor which may be ¼, 1/3, ½ or ¾ h.p., operating at 1725 r.p.m. on any standard voltage or current.

Pump has iron body, bronze impeller, and can be mounted in any position. Choice of either straight or priming cover.

FULFLO SPECIALTIES CO. Inc., BLANCHESTER, OHIO

Increase Production with

SAFCO Cutting Oil



Many concerns have increased the output of metal cutting machines 40% and more with Safco Koldkut Cutting Oil.

Increased speed and longer runs between regrinding are possible with Safco, without over-heating tools, because it more thoroughly lubricates, has several times the film strength of ordinary oils and has greater heat-absorbing qualities.

It gives a better finish and greater accuracy, too.

Order a trial drum on our satisfaction-guaranteed basis and prove to yourself that Safco saves money. Also write for booklet.

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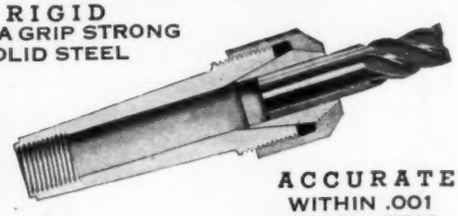
UNIVERSAL COLLET CHUCKS
WILL PULL ANY CUT
THE CUTTER WILL TAKE

RIGID
WITH A GRIP STRONG
AS SOLID STEEL



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UNIVERSAL ENGINEERING CO.
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MADE FOR THE DRILL PRESS

This Keyseating Miller is applied to the drill press and can be chucked as readily as any straight shank drill. Taper Shanks can be supplied. Made in 20 stock diameters. We also manufacture Oil-grooving Millers.

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2272 Spring Grove Ave. Cincinnati, Ohio

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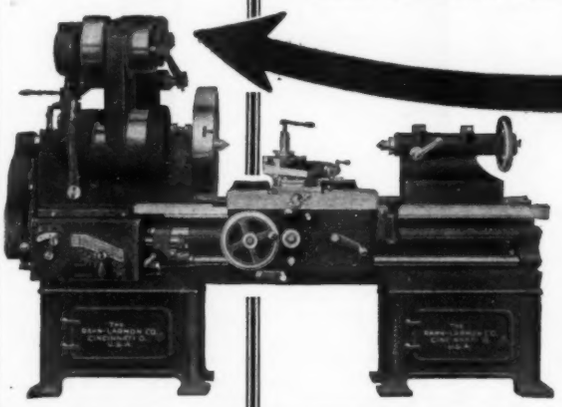
Easily Installed
Increased Efficiency
Instant Control
Smooth Operation
Long Wearing

The Cullman . . . Lathe Drive

This individual Electric Motor Unit was designed by Cullman to eliminate the old-fashioned countershaft overhead belting arrangement formerly used to drive Cone Pulley Machines.



The Cullman Lathe Drive will increase the efficiency of your shop. Original cost is low, and it is long wearing. Operation is easy and safe, and control is instantaneous. Any lathe, shaper, milling, or screw machine now being driven by overhead belting can be modernized by the installation of a Cullman Drive.

MADE IN SIZES FOR MOTORS RANGING FROM ½ to 7½ H.P.

60 DAYS' FREE TRIAL

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Write for particulars TODAY

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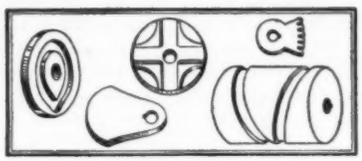
SPECIALIZING IN CAM DEVELOPMENT ALSO GENEVA MOTIONS



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AT LOWER COST

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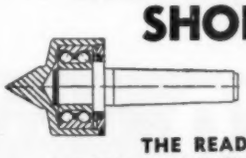
SHORT OVERHANG



Assures rigidity and eliminates chatter. Preloaded bearing guarantees accuracy.

THE READY TOOL COMPANY
Iranistan and Railroad Aves., Bridgeport, Conn.

The MACHINIST'S SLIDE RULE

(New Model) by BLACKMAN & NUETZEL MACHINERY CO.

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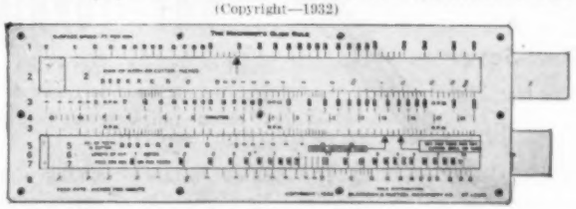

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Solves quickly the correct combinations of SPEED • FEED • CUT • TIME • POWER in Turning, Boring, Milling and Drilling. Shows Power Required and Total Cutting Time. Checks Simple Arithmetic.

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All celluloid, Vest Pocket size. FREE: Leather Case and Booklet of Instructions and Valuable Data. Price, Complete, ONLY **$3.50**

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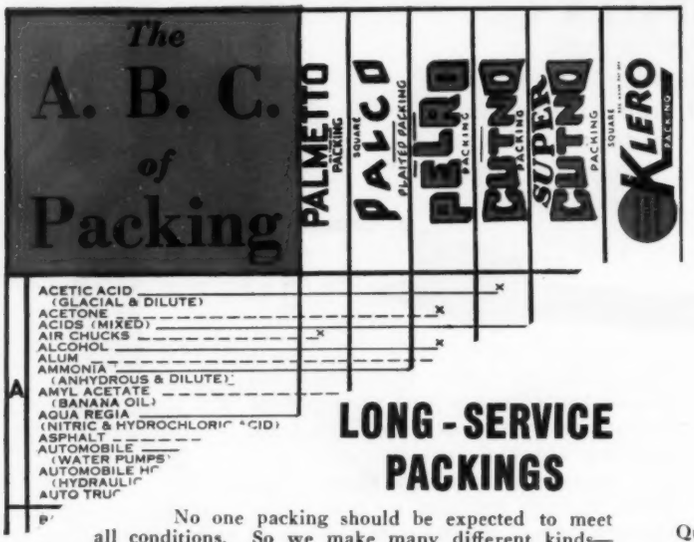


LONG-SERVICE PACKINGS

No one packing should be expected to meet all conditions. So we make many different kinds—the best for each principal use, with special lubricating compound to resist the gases or fluids encountered. See ABC charts in our catalog. "Palmetto" has no equal for service under high-pressure, super-heated steam and air. "Cutno" is for caustic soda, etc. "Super-Cutno" for heavy acids. "Pelro" for gasoline, alcohol, etc. "Klero" white-lubricated, odorless, tasteless, stainless, for sanitary pumps, etc.

BASA HAMMER

Quickly adjustable to provide a striking surface of copper, rawhide or babbitt—or any combination. In finishing and assembling work it is often desirable to use a hammer that can strike more than one kind of blow. The BASA does it without injury to surface struck. An exceedingly well built, serviceable hammer. Five sizes.

FAVORITE REVERSIBLE RATCHET WRENCH

A Time-Saver

SPEED UP NUT TURNING

Head does not leave the nut until operation is completed. Works on a quick straight ahead ratchet movement.

Reverse motion instantaneous by simply turning pawl. New metal in all parts enables the "Favorite" to withstand harder and rougher usage.

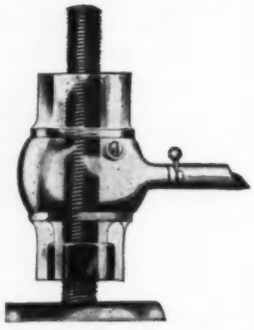
Each Head Can Turn Two Different-Sized Nuts

This is a great saving over ratchet wrenches that turn only one nut in each head, as it means fewer parts to keep on hand.

Skinned Knuckles Avoided and Time Saved—Head Cannot Slip Off Nut.

Can be used in narrower places than an ordinary wrench.

Opening in head allows bolt to pass clear through.



EMPIRE RAWHIDE MALLETS

These Rawhide Mallets are made from best-quality Water-Buffalo hides and have a moisture-proof finish.

The mallet-heads are formed under high pressure, giving them extra durability and resilience.

The handles are made of fine, straight-grained hickory to U. S. Government specifications.

MORAN'S STEEL BELT COUPLINGS

Unequalled for fastening round leather belts, can be used over again when belt itself is worn out.

No sudden breakage is possible, nor can it pull out.

WE also have Blake's Studs, Belt Hooks, Belt Lace, Plate Fasteners, Punches, etc.; Empire Speed Indicators.

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Tools and Gages

DEVELOPMENT of new cutting alloys has been accompanied by development of new methods of putting them to use. The improved materials, which have made possible higher cutting speeds and increased production between grinds, have required changes in cutter design to overcome manufacturing difficulties and provide necessary rigidity. Five of the items described on the following pages are new and improved methods for locking inserted blades in cutter bodies.

Designed to use circular cutters with the same method for accurate adjustment and positive locking features as is used in holding circular thread chasers, a recently announced hollow end-milling tool. By using more than one step on the cutters, several diameters can be turned at one pass. Cutters can be released automatically and backed off without marring the work upon completion of the cut. Self-opening dieheads and collapsible taps having receding chasers are among the new tools offered.

Two steel-cutting hard alloys recently announced are claimed to cut without galling. The harder of these alloys has a strength of 217,000 lb. per sq. in. in transverse rupture tests and a hardness of 92.0 on the Rockwell A scale. Another is recommended for interrupted cuts, heavy feeds and for applications where tool mounting cannot be made rigid.

Equipment for measuring tool and product parts is as essential to modern production methods as are cutting materials and tools. Measurements to an accuracy of 0.0001 in. are possible with two measuring engines, which can be fitted with measuring microscopes and similar equipment.

An improved contour projector provides a series of interchangeable objectives, ranging from 10X to 100X, which are practically parfocal. These objectives are easily interchanged in the instrument. Four screens are available for measuring projected contours.

PROGRESS

IN MANUFACTURING DRILLS AND REAMERS

Constant *Preparation* . . . for the Next *Advancement* in Drilling

Illustrations show drilling operations on small parts in which very small, accurate holes must be drilled one at a time. » » » » » » »

Contrast this with equally modern practice in heavy industries, where multiples up to many scores of drills are applied in the same instant to a single casting.

Preference for "Cleveland" Twist Drills and Reamers in each of these industrial extremes—and all the way in between for over 60 years—is due to the simple fact that each development here has been used to prepare for the next advance. » » » » » »

Send for a "Cleveland" man. The Company's resources in Experience, Personal Contact, Research and producting facilities are definite services that you can use to advantage. » » » » » »

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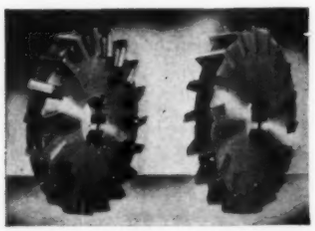
Cutters and Broaches—Grinding Wheels—Die Heads & Taps—Tool Steels—Measuring Tools and Gages—Hand Tools

Broaches, "Durakeen"

Connecticut Broach & Machine Co., New London, Conn. (Vol. 81,p.27.)

"Durakeen" broaches are a combination of a recently developed steel and a heat-treatment that is said to give toughness with extreme hardness.

It is said that the surface can be ground away without affecting the tool quality. These broaches have been successfully used for broaching S.A.E. 6150 steel, heat treated to 45 Rockwell.



Cutters, Milling, Inserted-Blade

National Twist Drill & Tool Co.. 6522 Brush St., Detroit, Mich. (Vol.81,p.590.)

"Adjusto - Lock" inserted-blade milling cutters provide for positive locking of blades in any position and for universal adjustment of the blades. More than 300 separate anchoring points are provided per square inch of blade surface. A minimum number of blades and wedges need be carried.

Cutter, Milling, "Jack-Lock"

McCrosky Tool Corp., 1345–85 S. Main St., Meadville, Pa. (Vol.81,p.306.)

The "Jack-Lock" wedge, developed for locking serrated blades in a tool body, has been

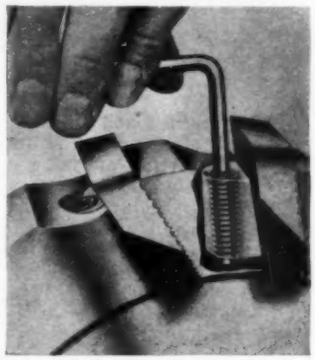
incorporated in a line of shell end mills and face milling cutters specially designed for using tungsten-carbide tipped blades.

Shell end mills with tungsten-carbide tipped blades are furnished in 3 to 8 in. diameters, medium-duty face mills range from 7 to 20 in. in diameter, and heavy-duty face mills are furnished from 7 to 20 in. in diameter.

Blades, Cutter, Serrated, "Tru-Ground"

McCrosky Tool Corp., 1345–85 S. Main St.. Meadville, Pa. (Vol.81,p.868.)

A serrated blade with serrations ground from the solid has been announced for use in inserted blade tools. The "Tru-Ground" form of serration omits every alternative tooth, the resulting pattern having a flat-bottomed groove between the teeth.



Blades, Cutter, "Gair-Lock"

Gairing Tool Co., Detroit, Mich. (Vol.81,p.870.)

"Gair-Lock" method of locking inserted blades is intended to give a wide range and easy adjustment for inserted blades in all multiple-blade cutting tools. The locking member, positioned in a shouldered re-

cess adjacent to the blade slot, fits the serrated blade and locks it.

Cutter, Trepanning

D & D Tool Co., 2518 Western Ave., Seattle, Wash. (Vol.81, p.1058.)

Made in three sizes to cover a full range of holes from ¾ to 6 in. diameter, the "hole cutter" has bits which can be adjusted independently and are easily replaced. The "Standard" cutter drills holes ¾ to 3 in. diameter, including all sizes within that range, with any electric drill or hand-brace.

Reamers, Tipped

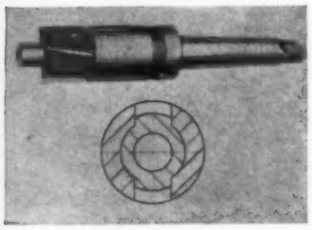
The Morse Tool Co., Detroit, Mich. (Vol.81,p.1292.)

A complete line of cemented-carbide tipped reamers in expansion and solid types has been announced. Standard sizes with either straight or taper shanks are available.

Counterbores and Spotfacers

National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich. (Vol.81,p.1234.)

Taper shank and socket construction of this line of heavy-duty spline-taper drive counterbores and spline-drive inverted spotfacers is claimed to provide permanent alignment and rigidity in these interchangeable counterboring tools. All cutters of the same diameter, as well as all other sizes in a given series or range, will fit interchangeably in the holder designed for that range. There are no screws, keys of loose pieces, nor any driving flats on the pilot to be rounded over in service.



Grinding Wheels

Bridgeport Safety Emery Wheel Co., Bridgeport, Conn. (Vol. 81,p.633.)

Vitrified - process resinoid-process and silicate-process grinding wheels are offered in addition to the specialized wheels formerly manufactured. Wheels of grain, grade and bond best suited for various types of work can be furnished.

Tool, Milling, Hollow-End

National Acme Co., 170 E. 131st St., Cleveland, Ohio. (Vol.81,p.264.)

This hollow end-milling tool is designed to use circular cutters with the same micrometric adjustment and positive locking feature as is used in holding circular chasers. By using more than one step on the cutters, it is possible to turn sev-

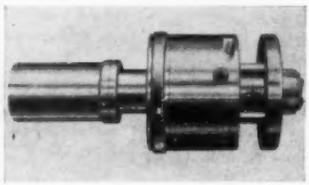
eral diameters with one pass. After the tool has completed the cut, the cutters are automatically released and backed off without marring the work. Standard cutters are available for end turning diameters from 0.056 to 1¾ in.

Tap, Collapsible, Receding-Chaser

Landis Machine Co. Inc., Waynesboro, Pa. (Vol.81,p.1233.)

The No. 3ALM receding chaser collapsible tap is designed primarily for tapping couplings, but may be applied to any machine employing a live spindle where resetting can be done automatically. There is no manually operated model. A cross slide cam is employed to control the taper

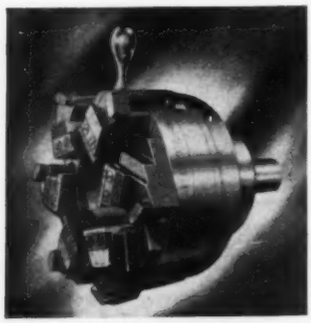
and a simple adjustment is provided for taper change and correction. This tap may be used for any taper of thread ranging from O, or straight threads, to ¾ in. taper per ft. Cutting coolant is admitted to the tap through a bronze yoke ring. Range is from 2 to 4 in. diameter, inclusive.



Diehead, Self-Opening, "Landmatic" No. 40-AX

Landis Machine Co., Waynesboro, Pa. (Vol.81,p.631.)

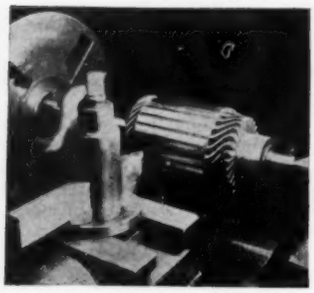
Capacity of this No. 40-AX Type H self-opening diehead is 4 to 5⅛ in. with a pitch range of 7 to 20 threads per inch. The head illustrated has a capacity of 7-in. thread length on 5⅛-in. diameter stock. This head is of the pull-off type for application to turret lathes and to hand screw machines.



Alloy, Metal-Cutting, Grades E and EE

Vanadium-Alloys Steel Co., Latrobe, Pa. (Vol.81,p.1054.)

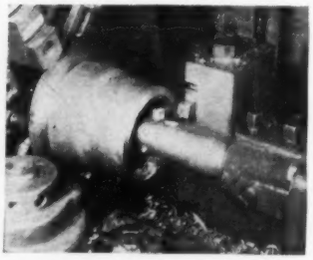
Grades E and EE Vascoloy-Ramet steel-cutting hard alloys are composed of tantalum carbide and some special ingredients which are claimed to prevent "galling" or "pick-up" when machining steels. The Grade E alloy has a strength in transverse rupture tests of 217,000 lb. per sq.in. and a hardness of 92.0 on the Rockwell A scale. Grade EE is softer and tougher than Grade E.



Alloy, Metal-Cutting, "Tantaloy"

Fansteel Metallurgical Corp., North Chicago, Ill. (Vol.81,p. 1060.)

"Tantaloy" material for hard-cutting tool and wear-resisting purposes is claimed to be especially suitable for use as a tip to be brazed to a steel shank to form a cutting tool. Containing tantalum carbide, this material is claimed to possess a high degree of chip slippage and the toughness required to make it efficient for interrupted cuts, heavy feeds, varying hardness of metal, and for applications where tool mounting is deficient in rigidity.



Alloy, Metal-Cutting, Stellite-2400

Haynes Stellite Co., 30 E. 42nd St., New York, N. Y. (Vol.81, p. 1119.)

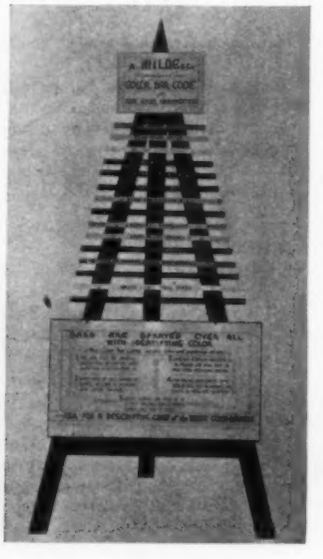
Listed as "Haynes Stellite-2400," this cobalt-chromium-tungsten alloy is claimed to have a greater edge strength and to operate with economical tool life at higher speeds than is possible with Haynes Stellite "J-Metal," with no reduction of feeds and depths of cut.

Steel, Tool, Color-Coded

A. Milne & Co., 741 Washington St., New York, N. Y. (Vol. 81,p.1175.)

Positive and ready identification of the grade of tool steel in hand is made possible by a system of color coding. Eighteen varieties of tool steels, from carbon tool steel to super high-speed steel, are completely sprayed for the entire length with an individual, identifying color.

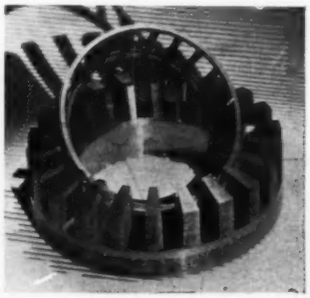
Several advantages accrue from using this color coding system: (1) Stock clerks, even though inexperienced, cannot mistake the grade of steel, (2) Inventories can be taken at a glance, (3) Different grades of steel may be kept together without danger of mix-ups. (4) Lost time and labor in the shop, and spoiled tools, are prevented. (5) Cut pieces delivered to the shop carry the identifying color until machined. (6) Material may be sent out to forge shops or other specialists without chance of mistakes.



Steel, Tool, Graphitic

Steel & Tube Div., The Timken Roller Bearing Co., Canton, Ohio. (Vol.81,p.207.)

Graphitic steel is claimed to combine the free machining and easy grinding qualities of gray cast iron with the hardenability of steel. This steel is made for both water and oil hardening applications in the die field, the oil hardening steel containing molybdenum. A typical perforating die as made from graphitic steel is shown.

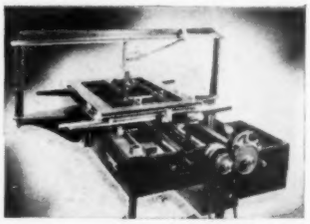


It has been found that this series of steels has the following apparent advantages: (1) easily forged at temperatures below 2,000 F., (2) machineability is comparable to that of cast iron, (3) ability to develop high surface hardness by simple heat-treatment, (4) response to selective hardening, (5) high resistant to wear, (6) freedom from "pick-up" scuffing and scoring, (7) resistant to repeated impact.

Tool Kit

Carboloy Co., 2985 E. Jefferson Ave., Detroit, Mich. (Vol.81, p.26.)

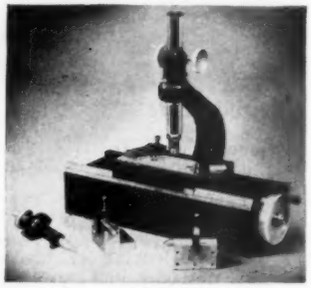
This kit contains nine Carboloy "milled and brazed" tools, a 20-page booklet describing the rapid grinding technique and a 12-page booklet showing more than 50 suggested applications for the nine tools. The nine tools are designed for general turning, facing and boring operations. All operations have been performed except grinding.



Measuring Engine, 14x17 In.

Mico Instrument Co., 10 Arrow St., Cambridge, Mass. (Vol.81,p.590.)

This 14x17-in. measuring engine can be furnished as a plate measuring device with the microscope underneath the carriage or it can be furnished with an overhead microscope. The basic machine can be used as a conventional single-coordinate comparator or into a two-coordinate comparator. It can also be used as the basis of a microdensitometer of a visual or recording type.

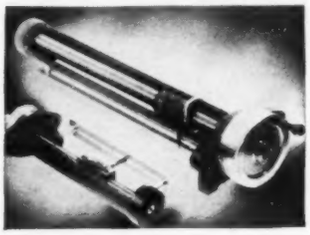


Measuring Engine, Precision

Mico Instrument Co., 10 Arrow St., Cambridge, Mass. (Vol.81, p.144.)

With this 20 cm. universal measuring engine, measurements of the length of opaque objects 8 in. (20 cm.) or less in length are possible with an accuracy of 0.0001 in. and measurements of transparent objects of 4 in. lengths or less can be made. An accessory cross carriage converts the tool

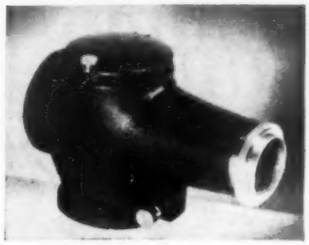
to a two-coordinate measuring device of 2x8-in. range. Other accessories adapt the machine to varied uses.



Leadscrews, Precision

Mico Instrument Co., 10 Arrow St., Cambridge, Mass. (Vol.81, p.302.)

Two standard precision leadscrews, one with 4 in. of nut travel and the other with an 8 in. travel, have been made available. These are offered as simple screws and nuts, also in cradle castings as complete units ready for installation.



Illuminators, Microscope

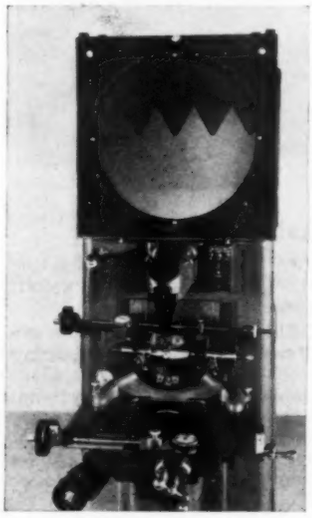
Mico Instrument Co., 10 Arrow St., Cambridge, Mass. (Vol.81, p.591.)

The basic unit for each of these high-intensity illuminators is a well proportioned aluminum casting that provides a strong housing for the lamp and a focusing slide for the condenser.

Projector, Contour

Bausch & Lomb Optical Co., Rochester, N. Y. (Vol.81,p. 892.)

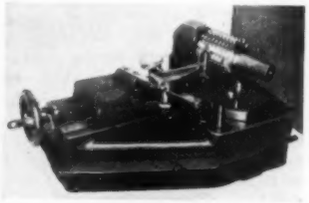
This improved contour measuring projector provides a series of interchangeable 10X, 20X, 25X, 50X and 100X objectives that are easily removed or inserted. Each objective automatically produces a screen image of the magnification rated on the objective. Objectives are practically parfocal, the object remaining in focus with a change of objectives. Vertical motion of the specimen table is controlled by a reversible driving motor with mercury trip switches. Projector is provided with four interchangeable screens.



Checker, Contour, Hob

Michigan Tool Co., 7171 E. McNochols Road, Detroit, Mich. (Vol.81,p.1292.)

This improved hob contour checker is designed to show any deviations from true pressure angle down to 0.0001 in. Interchangeable angle blocks are not required for checking hobs of

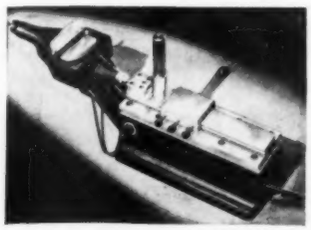


different pressure angles as a sine-bar setting is used. Indicator is provided with a multiplication of five to one, so that a movement of the contact finger of 0.0002 in. will register a travel normally representing 0.001 in.

Gage, Inspection, For Plug Gages

Sheffield Gage Corp., Dayton, Ohio. (Vol.81,p.1240.)

A visual-type checking device is offered to eliminate the human factor in checking tapered plug gages. This instrument is used to check the small diameter of the taper, and has a plain, horizontal bed. On one end of this bed is an adjustable anvil, at the other a visual gage head. In checking the

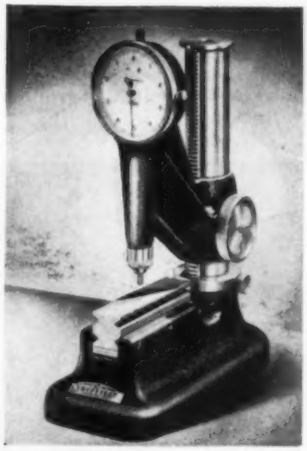


small diameter of a tapered gage in this device, precision gage blocks equivalent to the true diameter of the small end of the taper are used to set the gage to zero. The actual small diameter of the gage is read by substituting it for the stack of blocks. Value of the taper angle is determined by using a master angle block.

Gage, Comparator

Sheffield Gage Corp., Dayton, Ohio. (Vol.81,p.303.)

The comparator type gage illustrated retains many of the exclusive features of the "Visual" gages, the principal difference being a standard indicator mounted on the gaging head instead of the visual unit. Gaging head utilizes a fine adjusting sleeve.



Indicators, Dial

Federal Products Corp., 1144 Eddy St., Providence, R. I. (Vol.81,p.1000.)

Three dial test indicators, similar in design to the Model 2 instrument, are provided with a movement consisting of a combination lever and direct contact crown gear so that friction and wear are reduced to a minimum.

The Model 1 instrument was graduated in 0.001 in. and has a range of 0.030 in. The same type instrument is available in metric graduations and Model 3, metric, is graduated in 0.005 mm. with a total range of 0.2 mm.

Indicator, Dial, "Model 2"

Federal Products Corp., 1144 Eddy St., Providence, R. I. (Vol.81,p.585.)

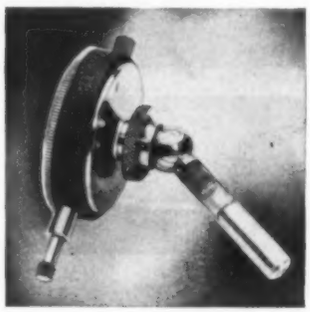
Designed for use with surface gages, height gages or in tool posts the "Model 2" test indicator with universal bar is

graduated to read to 0.0001 in. Range is 0.008 in. Universal bar is ¼x½x3 in. long. Adapter rods can be furnished.

Indicator, Dial, "Geneva" No. 125F

Chicago Dial Indicator Co., 180 N. Wacker Drive, Chicago, Ill. (Vol.81,p.592.)

The No. 125F Geneva dial indicator features a simple movement in which a lever arm is used instead of a combination of gears. Indicator reads to 0.001 in. and has a 0-50-0 scale.



Holder, Indicator, Universal

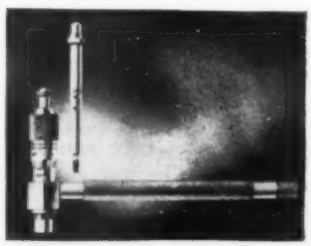
Chicago Dial Indicator Co., 180 N. Wacker Drive, Chicago, Ill. (Vol.81,p.674.)

"Geneva" universal holder for use with dial indicators permits universal setting. Movement is controlled by single knurled thumb nut.

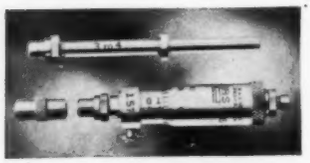
Micrometer, Inside

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 672.)

Inside micrometer No. 268 combines the advantages of a telescoping gage with those of an inside micrometer. Instrument has a range from 2 to 6



in. and provision is made for adjustment to compensate for wear of the measuring points.



Micrometers, Inside

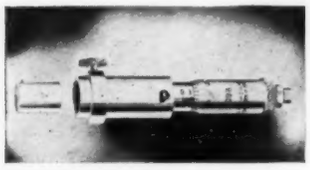
Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 304.)

An adjustable point and locknut on the thimble is featured in the No. 266 and No. 267 inside micrometers. Should wear occur, it is necessary only to change the setting of this adjustable point. The No. 266 tool has a range from 2 to 8 in. by thousandths. A 2 to 12 in. range is provided by the No. 267 micrometer, which also has an accuracy of 0.0001 in.

Micrometer Head, No. 280

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 468.)

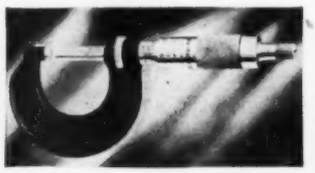
Micrometer attachment No. 280 has a movement of $\frac{1}{4}$ in. and can be used with all lengths of $\frac{3}{8}$-in. rods.



Micrometers, Stainless 1-in.

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 145.)

Model 11-B and Model 59-B, 0 to 1 in. micrometer calipers are now fitted with stainless steel barrels and thimbles. Where desired, these micrometers can be furnished with the measuring surfaces of the spindle and anvil faced with Tungsten Carbide.



Micrometers, Tips

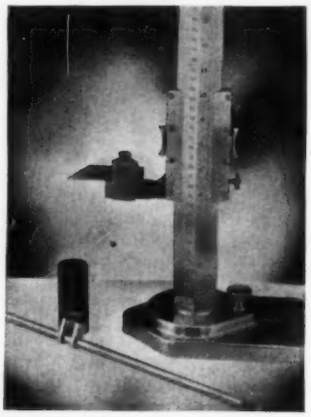
Carboloy Co., Inc., Detroit Mich. (Vol.81,p.387.)

A special micrometer tipping service is available to all micrometer users. The user may send his micrometer to the company, which will top the wear points at the end of the anvil and spindle with Carboloy cemented carbides.

Gage Plating Service

Dearborn Gage Co., Dearborn, Mich. (Vol.81,p.630.)

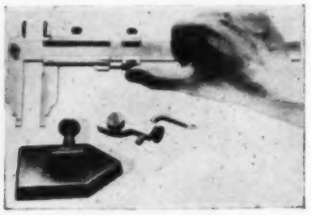
Chromium plating service is offered to users of Johannson gage blocks by this company. Advantages claimed are preservation of close accuracy for a much longer period of time and elimination of rust corrosion.



Gage, Height, Chesterman

George Scherr Co., 128 Lafayette St., New York, N. Y. (Vol. 81,p.385.)

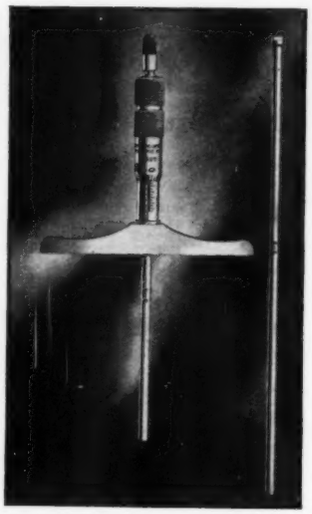
The sliding head of this gage may be moved throughout its entire range by a full-length, large-diameter screw which is inside the triangular scale beam. A quick release is provided for rapid, approximate adjustment of the head on the scale. Fine adjustment is secured with the vernier which is about $2\frac{1}{2}$ in. long. This vernier gives readings accurate to 1/1000 in. or to 1/50 mm. Scales are available in lengths of 12, 18, 24, and 40 inches.



Caliper, Vernier, Mauser No. 537

Geo. Scherr Co., 128 Lafayette St., New York, N. Y. (Vol.81, p. 1058.)

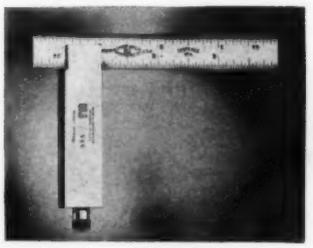
Available with measuring capacities of 7, 9 and 11 in., the Mauser No. 537 vernier caliper is graduated in 0.001 in. and in 1/128 in. A base is furnished for mounting the caliper vertically.



Gage, Depth, Micrometer

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 756.)

Having a range of 3 to 9 in., the No. 607 micrometer depth gage has a screw movement of 1 in. graduated in 0.001 in. Full range is obtained by the use of six measuring rods. These rods are $\frac{3}{16}$ in. in diameter and have hardened ends. Base is about $\frac{5}{16}$ in. thick and 4 in. wide.



Square, Adjustable, No. 555

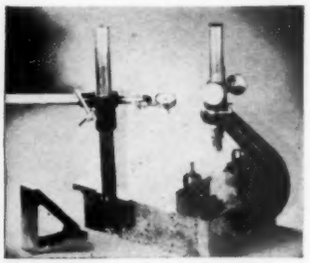
Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.81,p. 388.)

Adjustable square No. 555 has a 4-in. blade. The beam is $2\frac{7}{16}$ in. long and is hardened and ground. Large size makes it suitable for work where ordinary adjustable squares are too small.

Surface Plate, Three-Angle

Mico Instrument Co., 10 Arrow St., Cambridge, Mass. (Vol.81,p.144.)

This three-angle surface plate measures 9x12 in. on the top surface and is 3 in. high. The three surfaces are scraped flat to 0.0001 in. and the three angles are 90 deg. within 0.00025 in. in the 12-in. length. This plate can be used as a base for mounting microscopes and other accessory equipment.



Wires, Measuring, Gear

Van Keuren Co., 12 Copeland St., Watertown, Boston, Mass. (Vol.81,p.263.)

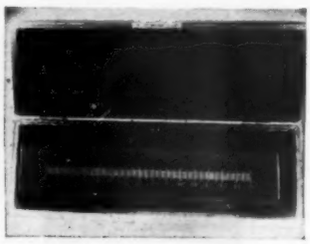
This set of gear wires is suitable for measuring the pitch diameter of either $14\frac{1}{2}$ or 20 deg. involute gears of any number of teeth from 9 to 200.

Angle Plate, Combination

F. Swenson, 203 Lafayette St., New York, N. Y. (Vol.81,p.28.)

This Ouellet combination angle plate and V-block for tool- and die-makers is cut from

machine-steel bar-stock and is pack-hardened to give a $\frac{1}{32}$-in. case all over. It is ground all over, except inside the bridge, after hardening.



Scales, Glass, Ruled

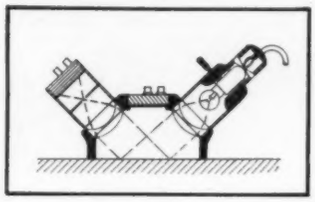
Mico Instrument Co., 10 Arrow St., Cambridge, Mass. (Vol.81, p.345.)

Three ruled glass scales are offered for use in measuring problems where a transparent scale can be used in direct contact with the work to avoid paralax. They are for use at unity to 10 or 15 diameters magnification. The glass blank is $7\frac{1}{2}$ in. long.

Gage, Ring, Wilco

Wilkening Mfg. Co., 2000 S. 71st St., Philadelphia, Pa. (Vol.81,p.466.)

The Wilco ring gage draws each ring against an angle which automatically maintains the same center line for all rings. Readings are made on a dial through a magnifying glass and undersizes and oversizes are indicated in ten thousandths of an inch.



Meter, Gloss

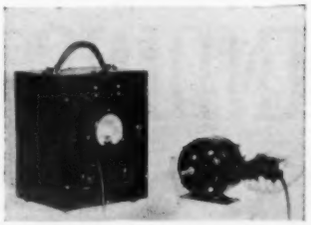
Pfaltz & Bauer, Inc., Empire State Bldg., New York, N. Y. (Vol.81,p.388.)

The photo-electric gloss meter is intended for objective determination of the gloss and polish of metals, glass, enamel, fabric, paper and similar materials. It also may be used for the measurement of diffused reflection and translucency. Measurements of reflected or diffused light are read on a micro-ammeter or a multiplex galvanometer.

Vibrometer

American Instrument Co., Inc., 8010-8020 Georgia Ave., Silver Springs, Md. (Vol.81,p.1239.)

Amplitude of vibration of structural or machine members can be measured with the "Vibrometer," which has a range from 0.001 to 0.30 in. amplitude. Instrument is designed to be held in the hand with the needle point against the vibrating part whose amplitude is to be measured.



Vibration Measuring Instruments

General Electric Co., Schenectady, N. Y. (Vol.81,p.1232.)

Improved models of vibration velocity measuring instruments are offered. The detector unit is a small electrical generator operating on a reciprocating motion. A small coil inside the unit is attached to the end of a projecting contactor rod. When the contactor rod is held against a vibrating object an internal coil moves back and forth within a strong magnetic field, generating a voltage proportional to the rate of motion of the coil, which is the velocity of vibration.

Balancing Equipment, Portable, "Davey"

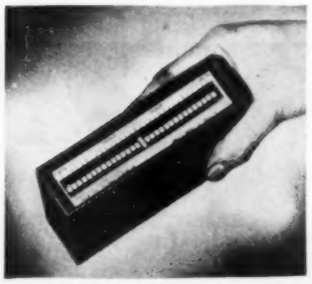
Electrocon Corp., 6 Varick St., New York. (Vol.81,p.342.)

Several improvements in design have been announced. This outfit is suitable for balancing large turbines and auxiliary machines.

Tachometers, "Frahm"

James G. Biddle Co., 1211-13 Arch St., Philadelphia, Pa. (Vol.81,p.676.)

Designed to measure speeds ranging from 9,000 to 30,000 r.p.m., "Frahm" high-range



series of vibrating-reed tachometers are suitable for measuring vibrations as well as rotational speeds.

Vibration Pick-Up, Model 156

Sundt Engineering Co., 4238 Lincoln Avenue, Chicago, Ill. (Vol.81,p.425.)

Model 156 "Sunco" inertia-type crystal vibration pick-up is claimed to be so sensitive that it will pick up the vibrations from the escapement of a wrist watch.

Indicator, Speed, "Probator"

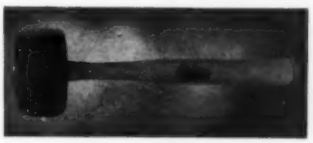
Montgomery & Co., Inc., 129 Crosby St., New York, N. Y. (Vol.81,p.1061.)

A counter and the works of a stop-watch have been combined in the "Probator" speed indicator so that they simultaneously are thrown in and out of gear.

Files, Hand, "Bite-Rite"

Henry Disston & Sons, Tacony, Philadelphia, Pa. (Vol.81,p. 184.)

"Bite-Rite" hand files feature staggered teeth which cut level and smooth. A round, smooth, open gullet that is non-clogging has been included in the design.



Mallets, Thorite

Forsberg Mfg. Co., Bridgeport, Conn. (Vol.81,p.387.)

Available in four sizes, "Whale Thorite" mallets are not affected by age, grease or oils. These mallets are of variable concentration, weights a..d hardness.

Screwdrivers, Type WP

Bonney Forge & Tool Works, Allentown, Pa. (Vol.81,p.713.)

A line of screwdrivers is offered to fit all sizes of Phillips screws. Blades are drop-forged from steel.

Tongs, Chain, Pipe

J. H. Williams & Co., 75 Spring St., New York, N. Y. (Vol.81, p.808.)

"Vulcan Supertongs," drop-forged from alloy and high-tensile steel and equipped with alloy steel chain that has been heat-treated and cadmium-plated, are available in eight sizes, for pipe ranging from $\frac{1}{8}$ to 18-in. diameter.

Wrench Set, No. 33

Holo-Krome Screw Corp., Hartford, Conn. (Vol.81,p.145.)

This socket screw wrench set contains eleven "file hard" spring tempered wrenches which fit all hexagon-type set-screws from No. 8 to 1-in. diameter inclusive.

Wrenches, "Hex-Box"

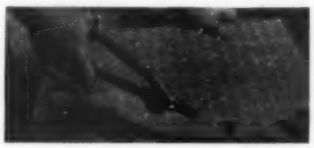
J. H. Williams & Co., 75 Spring St., New York, N. Y. (Vol.81, p.804.)

Designed with heads of approximately the same height as the nuts with which they are to be used, "Hex-Box" wrenches have comparatively thin headwalls which are efficient in close quarters. Openings range from $1\frac{1}{4}$ to $3\frac{1}{4}$ in.

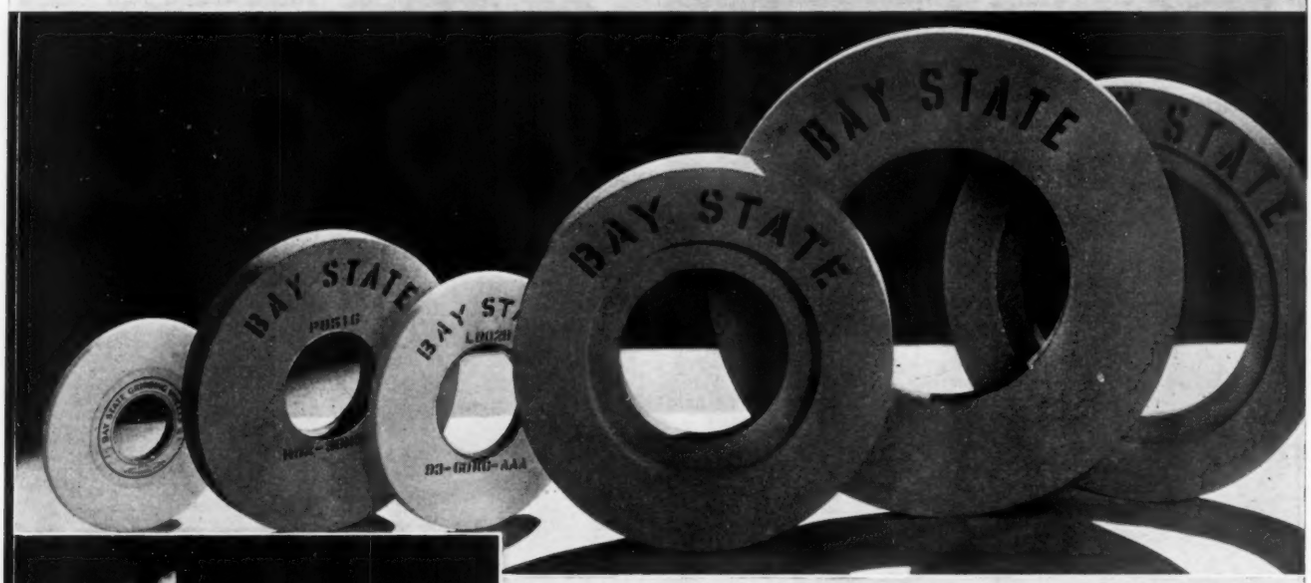
Snip, "Scroll Pivoter"

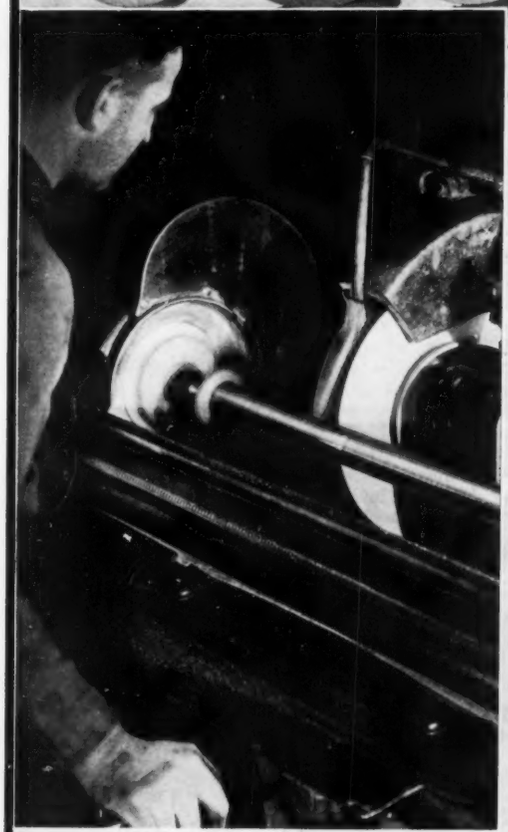
J. Wiss & Sons Co., Newark, N. J. (Vol.81,p.146.)

The No. 9X "Scroll Pivoter" snip, because of its design, is able to pivot as it cuts. User can follow curves and angles in cutting and trimming. It will cut metal up to 17 gage.



CYLINDRICAL GRINDING WHEELS



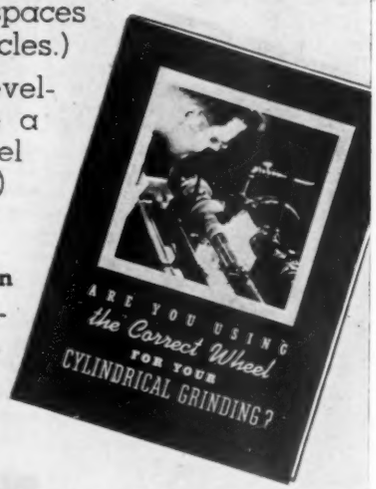


These representative features of Bay State's scientific methods of manufacture are giving proven, profitable, production on all types of cylindrical grinding operations.

FRACTIONAL GRADES (Three degrees of hardness in a single grade.)

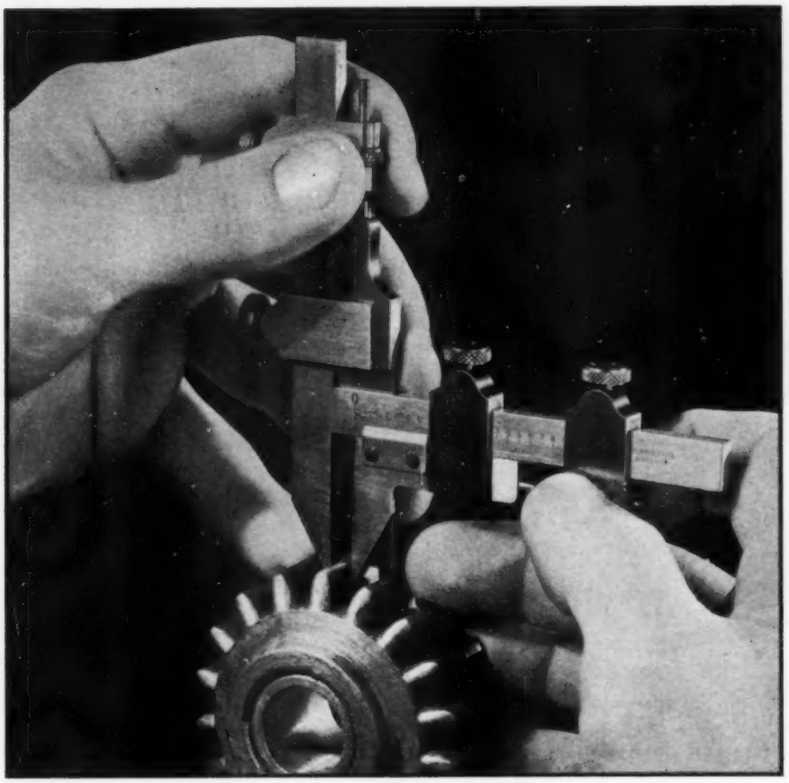
CONTROLLED POROSITY (Control over the size and distribution of pore spaces between abrasive particles.)

H9 VITRIFIED BOND (A development designed to give a cooler cut, increased wheel life, and better production.)



Send for our new bulletin on cylindrical grinding, containing proven wheel specifications. Simply mail us this page, with your name and address in margin.

BAY STATE
ABRASIVE PRODUCTS COMPANY
WESTBORO MASSACHUSETTS



STANDARD SHOP EQUIPMENT

Starrett Tools have been standard equipment in metal working shops for more than half a century. Revised Starrett Catalog No. 25C and the Special Dial Indicator Catalog illustrate and describe more than 3000 fine precision tools, tapes, hacksaws and dial indicators. Write for copies.

BUY THROUGH YOUR DISTRIBUTOR

THE L. S. STARRETT CO.
ATHOL, MASS., U. S. A.

World's Greatest Toolmakers—Manufacturers of Hacksaws Unexcelled
Steel Tapes, Standard for Accuracy
Dial Indicators for Every Requirement

DIAL INDICATORS Nos. 25-A, 25-F

NO. 239 HEAVY DUTY MICROMETER

DOVETAIL VERNIER CALIPER No. 438

MICROMETER No. 230

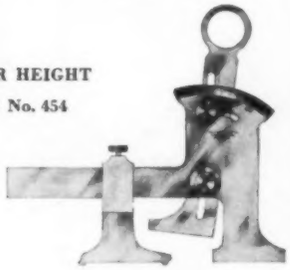
VERNIER CALIPER No. 122

GEAR TOOTH VERNIER CALIPER No. 456

VERNIER DEPTH GAGE No. 448

INSIDE MICROMETER No. 124

VERNIER HEIGHT GAGE No. 454



CUTTER CLEARANCE GAGE No. 459

Use Starrett Tools

American Swiss

Files of Precision

ARE

SWISS PATTERN FILES

MADE IN AMERICA

American Swiss pattern files are the only type we manufacture.

American Swiss Files are quality precision tools—the product of long experience in file making.

Their reputation for long life and lower filing costs has been earned by actual use in the hands of skilled mechanics.

More than 2000 regular shapes, cuts and sizes from which to choose the exact type file for the job.

Every file rigidly inspected for shape, cut, size and hardness, and keener filing edges, better results guaranteed for performance.

Special files made to order.

Not Files for a Price
BUT Files for Low Cost Production

KNURLED HANDLE NEEDLE FILES

RIFFLER FILES

REGULAR SWISS PATTERN FILES

AMERICAN SWISS FILE & TOOL CO.

ELIZABETH BUY FROM THE DISTRIBUTOR **N. J.**

Also Manufacturers of Mechanics Hand Tools and Knurls

The MARK of SUPER QUALITY

FILES TRADE · ONLY THE BEST ARE GOOD ENOUGH · TOOLS MARK

LOOK ON THE TANG— FOR THIS MARK

Swiss Pattern Files are the only type we manufacture

NORTON ABRASIVES

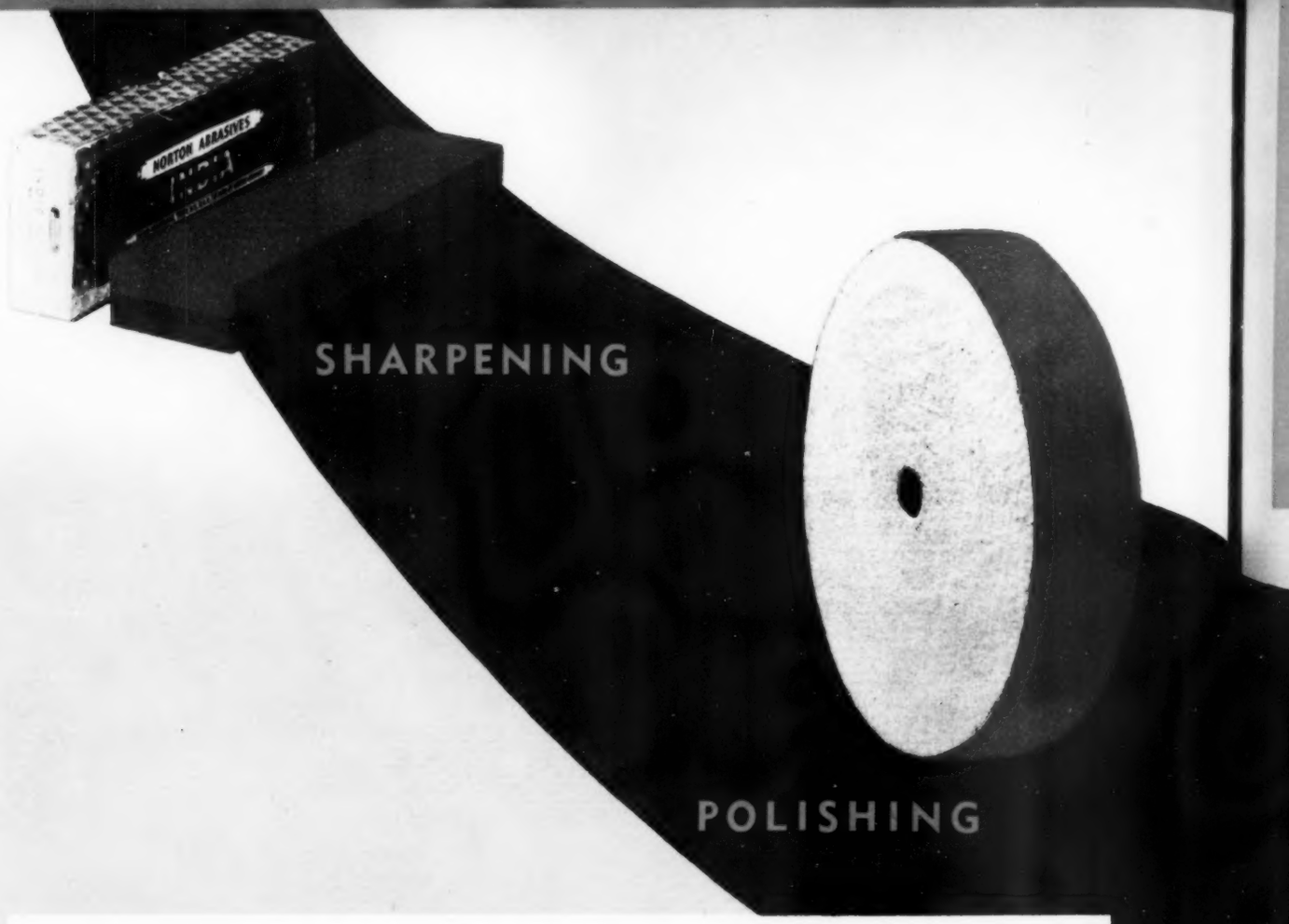
World Wide Use
World Wide Service

—203 Distributors Serving the Americas.

—Central foreign office in London and four European factories.

—Distributors in the industrial centers of Scandinavia, Africa, Asia and the Orient.

NORTON ABRASIVES

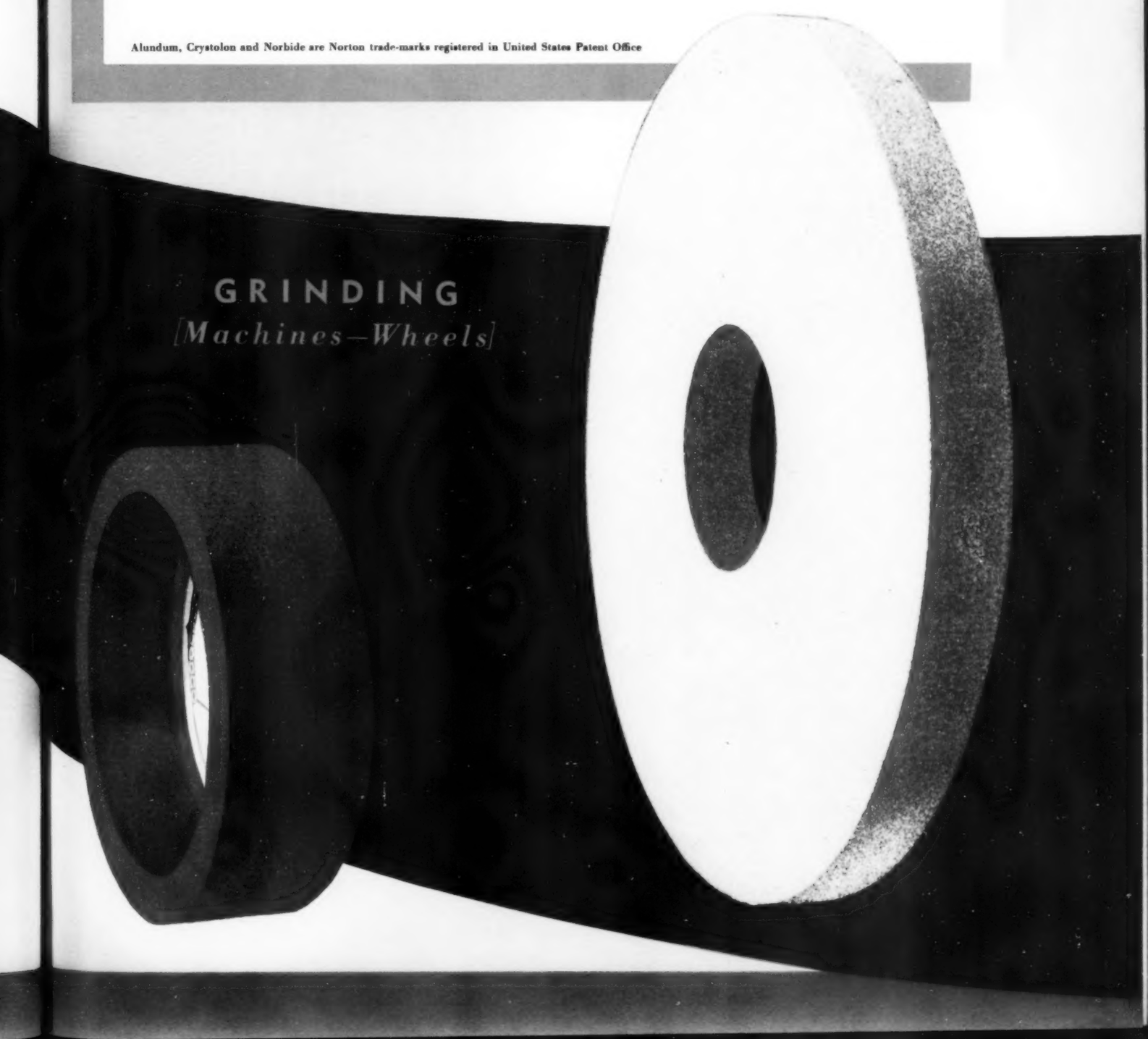


WORLD'S LARGEST— Progressive research and development have resulted in Norton plants that are the world's largest for the production of abrasive products. World-wide demand has built Norton branch factories in Canada, England, France, Germany and Italy. At Troy, N. Y., is the Behr-Manning Division with a large, modern plant for the production of coated abrasive products (abrasive papers and cloths).

NORTON COMPANY, WORCESTER, MASSACHUSETTS

RESEARCH in the field of abrasives and their uses has never lagged. From the Norton laboratories have come many important contributions — Alundum Abrasive, 38 Alundum Abrasive, Norbide (Norton Boron Carbide), the exclusive Norton bonding processes known as "B" Bond and "B-E" Bond, Controlled Structure, Diamond Wheels and "I-R" Crystolon Abrasive, the latest contribution to the glass and stone industries. In the fields of sharpening, polishing and grinding Norton research goes continuously on — developing still newer products to meet tomorrow's needs.

Alundum, Crystolon and Norbide are Norton trade-marks registered in United States Patent Office



HANDLING HEAT—The same Norton research that has solved so many grinding problems has aided the world's industries in the handling of heat. Norton abrasives have important refractory properties that have been utilized in the production of a line of light ware for the laboratory and heavy duty refractories for production. Three materials—fused alumina (Alundum), silicon carbide (Crystolon) and fused magnesia—make it possible to meet individual conditions—for melting metals, for heat treating metals, for enameling metals.

NORTON COMPANY · WORCESTER, MASSACHUSETTS · U. S. A.

New York Chicago Detroit Cleveland Philadelphia Pittsburgh Hartford London

BEHR-MANNING DIVISION, TROY, NEW YORK

P&W is Headquarters for Precision Small Tools

Pratt & Whitney small tools will cut better, faster and longer—and in those few words are bound up 77 years of designing and building cutting tools. For you, the user, they mean the lowest possible cost per piece. Isn't that all you need to know? Would you be more convinced if we told you of the careful selection of special steel for each type of tool—of the special heat treatment to make them hard and tough—and to give keen cutting edges that keep on cutting through long hours of service?

No matter what type of small tools you use, get in touch with us. We can give you quality—for which there is no substitute—plus real economy.

Pratt & Whitney

DIVISION NILES-BEMENT-POND CO.

HARTFORD, CONNECTICUT

Write for a copy of our Small Tool Catalog

Dial Indicator Model C-10

Graduated to .0001 inch, this model has a diameter of 2¼". Light in weight and with a range of .3".

Dial Indicator, Model C

Used extensively in all shops where large quantities of duplicate parts are produced. Can be attached to Millers, Grinders, Lathes, etc., and to Surface Gauges. Graduated to .001".

Machinists' Bench Gauge

For rapid and accurate measurement of small parts. Quick acting, easy read. Graduated to .001".

RANDALL & STICKNEY
Dial Gauges and Indicators

As precision gauge-makers of 53 years standing we confess to two strong convictions.

First, that a man ought to be able to stake his job on the reliability of the gauge he is using.

Second, that a gauge should be able to stand the gaff of daily use in a plant.

That's the simple reasoning and designing back of all Randall & Stickney Gauges. Accuracy is achieved without delicacy of parts. Case and plate are two separate units so that repairs, when necessary, can be easily and quickly made.

There's an R & S Precision Gauge or Indicator for practically every purpose you can name. Write for circulars and catalog describing our Complete Line.

FRANK E. RANDALL
248 Ash Street
Waltham, Mass., U. S. A.
Makers of Gauges Since 1885

Dial Test Indicator

Is most convenient for inspection or erecting, such as lining up work on planers, surface grinders, milling machines, etc. Adjustable to any angle. Arm can be easily taken off and used in tool post of lathe, if desired.

RANDALL & STICKNEY PRECISION GAUGES OF QUALITY

Universal Gauge

Adapted to a great variety of uses. Adjustable table, at lowest point, enables measuring of material up to 2 in. Graduated in .001".

THE LOW-COST WAY TO USE DIAMONDS FOR DRESSING GRINDING WHEELS

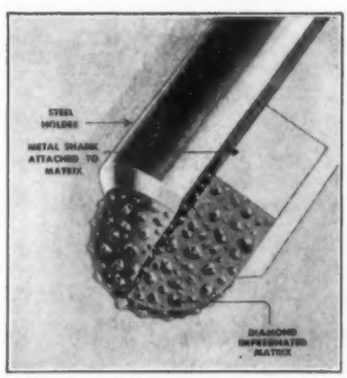
HERE IS the most *economical*—the most *practical* way to use diamonds for dressing grinding wheels . . . a way that eliminates *all* remounting expense and *all* hazards of diamond loss, breakage or burning!

Instead of using a single, large expensive stone, you use a special diamond-impregnated matrix loaded from base to peak with tough-scaled, virgin-diamond particles. These diamonds are actually wetted to the special matrix. They are held securely throughout the life of the dresser. To provide a new cutting surface, you merely give the dresser a quarter turn in its holder. Simple! Economical! That's why you get diamond results without diamond worries!

Available in 3 sizes, priced at $9.60, $12.60 and $15.35 (including desired holder), for rough, semi-finish and finish dressing.

CARBOLOY COMPANY, INC.

CHICAGO • CLEVELAND • DETROIT • NEWARK • PHILADELPHIA • PITTSBURGH • STAMFORD, CONN. • WORCESTER, MASS.
CANADIAN DISTRIBUTOR: CANADIAN GENERAL ELECTRIC COMPANY, LTD., TORONTO



No wonder you can save from 10 per cent to 25 per cent on diamond dresser costs with *this* dresser! It's low priced—eliminates remounting expense—and avoids the hazards of diamond loss, breakage or burning. That's why you get diamond results without diamond worries!

Prices include holder

CARBOLOY DIAMOND
(DIAMOND IMPREGNATED)
WHEEL DRESSERS

CARBOLOY COMPANY, INC.
2989 E. Jefferson Ave., Detroit, Mich.
☐ Mail us further information.
☐ Enter our order for_____ dressers at $_____
size_____ (Specify holder dimensions.)
Name_____ Title_____
Company_____
City_____ State_____

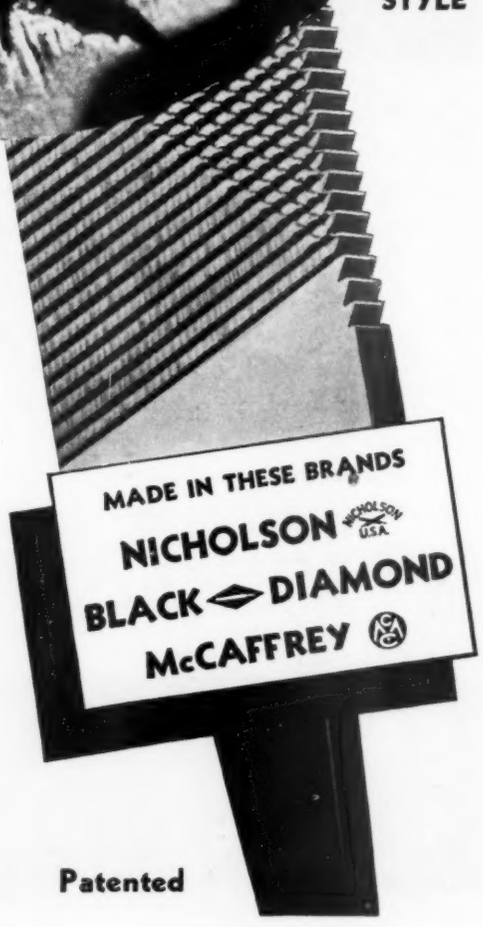
PATENTED TOOTH CONSTRUCTION

Reserve Cutting Edges Lower Filing Costs

Only the Nicholson File Company makes files with reserve cutting edges that go to work as old ones wear down. And you can see the difference in the Patented Tooth Construction that makes possible this unique advantage.

The top edges of the tooth points are irregular . . . the patented principle of controlled serrations. This is the feature that sends in fresh reserves of cutting edges to keep on working at full efficiency when old style files are ready for the discard.

Old style files cost up to 40% more to use than files with the new patented tooth construction. That's a vital reason for using the only files which have the new Patented Tooth Construction . . . Nicholson, Black Diamond, McCaffrey. At mill supply dealers' and hardware wholesalers'. Nicholson File Company, Providence, R. I., U. S. A.



A FILE FOR EVERY PURPOSE

Patented

PRODUCTION PROBLEMS ARE LARGELY TOOL PROBLEMS

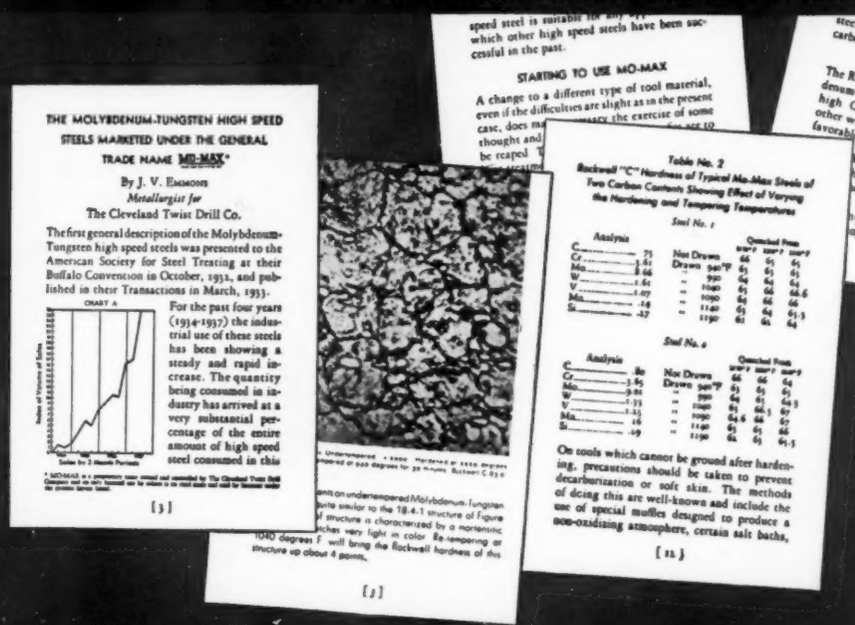
. . . and the principal tool problem is the STEEL PROBLEM

MO-MAX

TRADE MARK REG. U.S. PAT. OFF.

MOLYBDENUM-TUNGSTEN HIGH SPEED STEEL

has been meeting the most severe production requirements for years. Leading Steel Companies in North America and Europe are now licensed to make MO-MAX.


THE MOLYBDENUM-TUNGSTEN HIGH SPEED STEELS MARKETED UNDER THE GENERAL TRADE NAME MO-MAX*

By J. V. Emmons
Metallurgist for
The Cleveland Twist Drill Co.

The first general description of the Molybdenum-Tungsten high speed steels was presented to the American Society for Steel Treating at their Buffalo Convention in October, 1932, and published in their Transactions in March, 1933.

CHART A

For the past four years (1934-1937) the industrial use of these steels has been showing a steady and rapid increase. The quantity being consumed in industry has arrived at a very substantial percentage of the entire amount of high speed steel consumed in this

[3]

Table No. 2
Rockwell "C" Hardness of Typical Mo-Max Steels of Two Carbon Contents Showing Effect of Varying the Hardening and Tempering Temperatures

Steel No. 1

Steel No. 2

On tools which cannot be ground after hardening, precautions should be taken to prevent decarburization or soft skin. The methods of doing this are well-known and include the use of special muffles designed to produce a non-oxidizing atmosphere, certain salt baths,

[12]

STARTING TO USE MO-MAX

A change to a different type of tool material, even if the difficulties are slight as in the present case, does ma

RED HARDNESS

The Red Hardness or Hot Hardness of Molybdenum-Tungsten high speed steel is notably high. Comparisons that have been made with other well known high speed steels have been favorable to the Molybdenum-Tungsten type.

SULTIES AND OBJECTIONS RAISED

he objections that have been raised to bdenum-Tungsten type of steel are as

ventories which formerly existed of ngsten high speed steels would have

[16]

THIS NEW EDITION

of the booklet shown contains the latest data on Molybdenum-Tungsten High Speed Steels and a microscopic comparison with 18-4-1 under different heat treatments. Write for your copy to THE CLEVELAND TWIST DRILL CO., CLEVELAND, O.

SHIFT TO MO-MAX FOR QUALITY AND QUANTITY PRODUCTION

MO-MAX is a proprietary name owned and controlled by The Cleveland Twist Drill Company and its only licensed use by others is on steel made and sold by licensees under U. S. Patent Nos. 1,937,334; 1,998,953; 1,998,954; 1,998,955; 1,998,956; 1,998,957 and Canadian Patent Nos. 346,506; 364,032 and 364,033.

PRECISION INSTRU

SPECIALISTS IN MICROMETER CALIPERS OF SUPREME ACCURACY AND QUALITY

IN precision measuring devices—as in other fields — there are outstanding leaders. *Some one* builds the better mousetrap; and in this instance, industry has definitely bestowed its approval on J. T. Slocomb Company these 47 years.

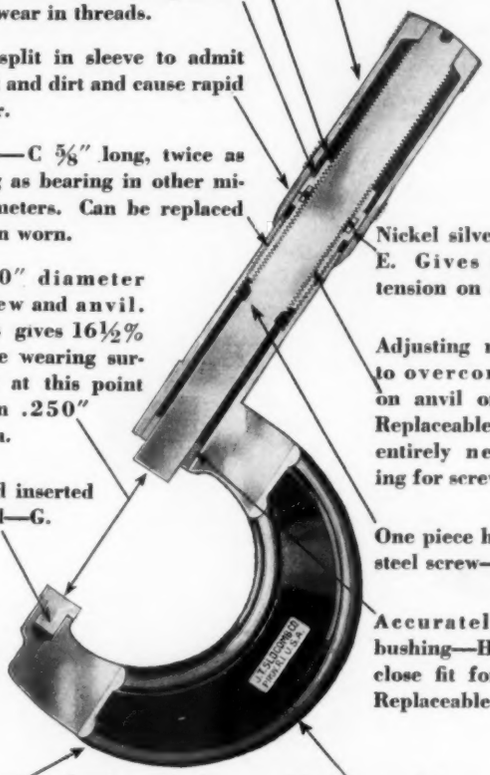
Slocomb Micrometer Calipers—outside and inside — are made in as many types as there are manifold uses for them. In size, the range is from the very smallest to the largest practical to use.

In this advertisement, we have departed slightly from the orthodox to show you the simplicity and ruggedness of the precision construction, as well as the great ease of use.

Only the representative types are shown—but you are invited to send for the book— New Catalog 18—that leaves nothing untold!

Pictures and describes all the famous Slocomb measuring devices.

A compendium of essential measuring facts, easily found and understood.



Arrangement of nuts insuring long bearing in spite of wear.

Short nut—D to compensate for wear in threads.

No split in sleeve to admit dust and dirt and cause rapid wear.

Nut—C 5/8" long, twice as long as bearing in other micrometers. Can be replaced when worn.

.270" diameter screw and anvil. This gives 16½% more wearing surface at this point than .250" diam.

Solid inserted anvil—G.

I section frame—B drop forged from bar steel.

Decimal equivalents stamped on thimble.

F—Thimble.

Nickel silver spring E. Gives uniform tension on screw.

Adjusting nut—C to overcome wear on anvil or screw. Replaceable, giving entirely new bearing for screw.

One piece hard tool steel screw—A.

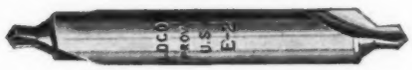
Accurately fitting bushing—H insures close fit for screw. Replaceable.

Black enameled or polished frame.

SLOCOMB MICROMETERS ARE USED ALL OVER THE WORLD.

MEASURING MENTS

THE STANDARD RECOGNIZED BY THE GREATEST NUMBER OF ENGINEERS AND MACHINISTS



CENTER DRILLS

Made in three types—center drills, combination center drills and bell type center drills. Furnished either in carbon or high speed steel.

IN THOUSANDTHS AND TEN-THOUSANDTHS

While readings in thousandths are standard, Slocomb Micrometer Calipers graduated in ten-thousandths, are available. They are just as quick reading as those with coarser graduations and have the same multiplicity of uses. The book describes these, too.

J. T. SLOCOMB CO.

Machinist's Tools

PROVIDENCE, RHODE ISLAND, U. S. A.

MICROMETER CALIPER No. 22 ONE HALF INCH

Plain or with Friction Stop. Graduated in thousandths. Measures from 0 to ½". Weight only 1¾ oz. Readily carried in vest pocket. Although the lightest made, no finer micrometer is to be had. Graduated in inches or metric system. See Catalog 18 for details.

No. 25 QUANTITY PRODUCTION MICROMETER

Saves time and eyestrain in measuring repeatedly to a given size. Reads .002 plus or minus. Large diameter provides 3/16" spacing between thousandth marks. Reads in ten-thousandths direct. Details in Catalog 18.

MICROMETER SET No. 28—12" to 24"

12 micrometers and end measures—12" to 24"—in a rack. In connection with set No. 20, covers from 0" to 24". Graduated to read in thousandths. Whole rack only 33½" x 17½" x 26". Available to measure 300 m.m. to 600 m.m., where desired and with metric #20, from 0 m.m. to 600 m.m. See Catalog 18 for full data.

The Tool Job Starts Right

—All— along the line

the Color Bar Code saves time and prevents errors

STOCK ROOM

Grades are racked accurately when received . . . The bars can be readily identified after being cut, no matter how small the piece . . . Stock clerks can tell quickly how much steel of each grade is on hand . . . Different grades can be racked together to save space, when desired.

TOOL ROOM

The tool maker can tell definitely whether the steel delivered to him is correct . . . he is no longer dependent on the stock clerk for proper selection. Tool bits retain their color and their identity during use.

HARDENING ROOM

The heat treater can confidently follow hardening instructions, knowing by the color that the steel is the grade specified.

- and Stays Right

when it's a

MILNE TOOL STEEL

identified by the

New COLOR BAR CODE

The different grades of Milne Tool Steel are now identified by bright lacquer colors *sprayed the entire length of the bar.*

Stock clerk, tool maker, heat-treater, — anyone handling these steels can tell the grade at a glance, no matter how small the piece being worked.

Eliminate confusion and costly errors in your tool department by using Milne Tool Steels and the Color Bar Code.

THE COLOR BAR CODE WALL CHART

A Wall Chart of the Color Bar Code, showing the exact colors for all grades, and including instructions for Heat Treating, will be sent to tool steel users on request. Write our New York Office, or ask the Milne representative when he calls.

NEW YORK
741-3-5 Washington St.

A. MILNE & CO.

BOSTON
915 Oliver Bldg.

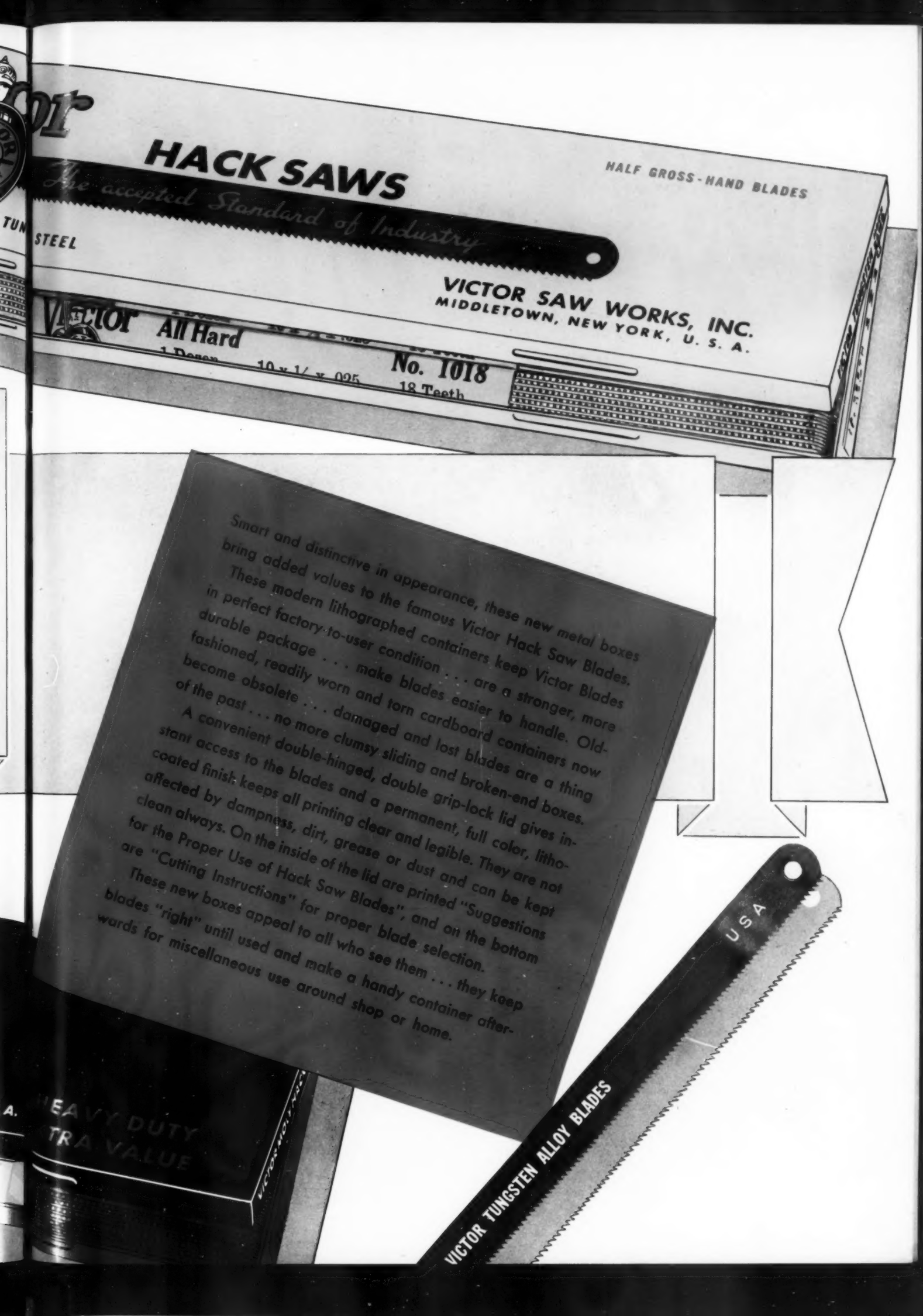
CHICAGO PITTSBURGH NEW ORLEANS DETROIT

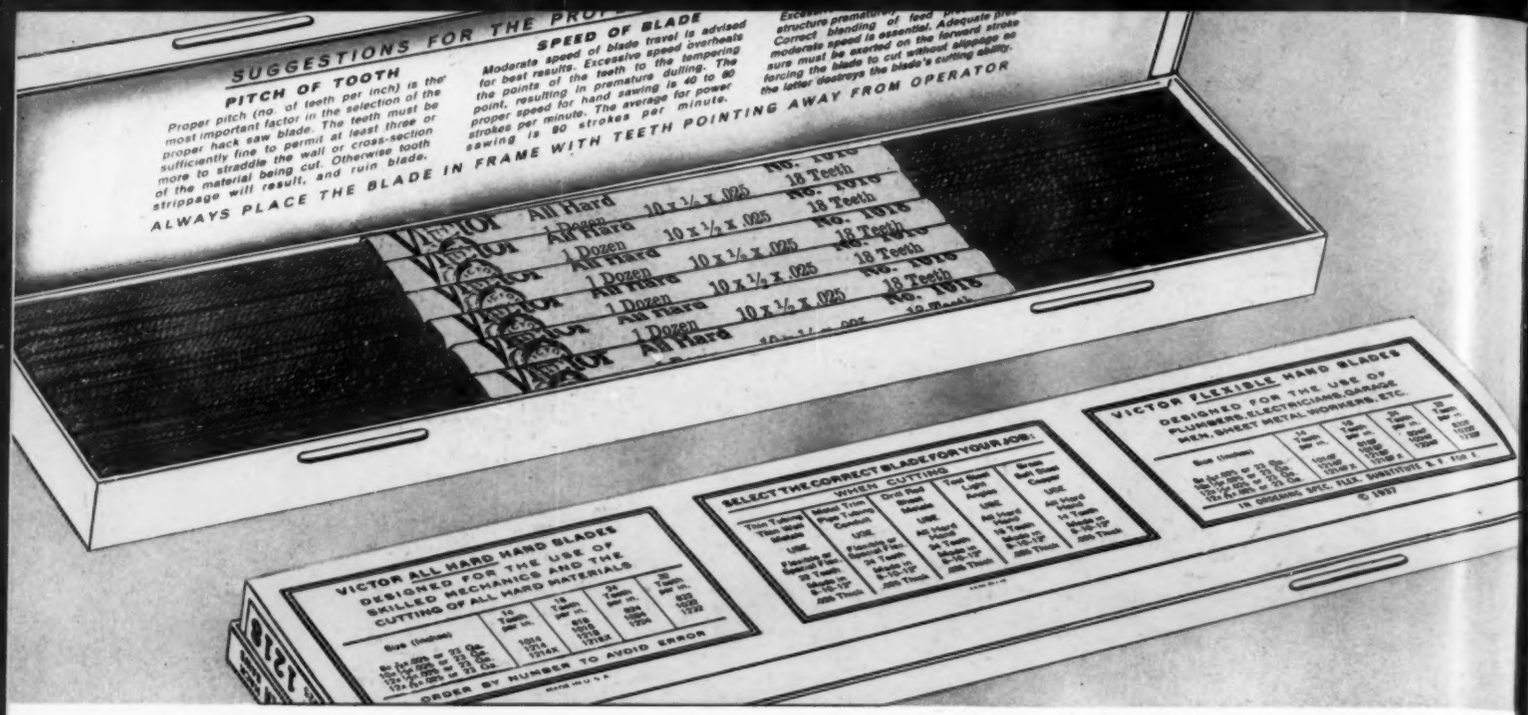
HIGH SPEED STEELS • ALLOY TOOL STEELS • CARBON TOOL STEELS

"THE LATEST AND BIGGEST HACK SAW BLADE NEWS"
Here is most important news to the metal-cutting industry regarding the modern packaging of Victor Hack Saw Blades.
Victor Hand Hack Saw Blades, both "Moly" and Tungsten, are now packed in modern metal boxes . . . up-to-date utility containers that represent an entirely new packaging method, bringing additional convenience to users . . . and new sales to dealers.
VICTOR TUNGSTEN ALLOY BLADES
USA
VICTOR SAW WORKS, INC.
Middletown, N. Y.
VICTOR HACK SAWS Wins on Merit

Sturdy...light weight. Moisture-proof. Handy double-hinged lid. Tightly sealed double grip-lock. Space saving. Attractive ...distinctive. Easily kept clean. Useful for odds and ends.

NOW PACKED IN MODERN METAL BOXES . . . FOR PROTECTION AND EASE OF HANDLING AT ALL TIMES


HACK SAWS
The accepted Standard of Industry
HALF GROSS - HAND BLADES
STEEL
VICTOR SAW WORKS, INC.
MIDDLETOWN, NEW YORK, U. S. A.
Victor All Hard
1 Dozen 10 x 1/ x .025
No. 1018
18 Teeth
Smart and distinctive in appearance, these new metal boxes bring added values to the famous Victor Hack Saw Blades. These modern lithographed containers keep Victor Blades in perfect factory-to-user condition . . . are a stronger, more durable package . . . make blades easier to handle. Old-fashioned, readily worn and torn cardboard containers now become obsolete . . . damaged and lost blades are a thing of the past . . . no more clumsy sliding and broken-end boxes. A convenient double-hinged, double grip-lock lid gives instant access to the blades and a permanent, full color, litho-coated finish keeps all printing clear and legible. They are not affected by dampness, dirt, grease or dust and can be kept clean always. On the inside of the lid are printed "Suggestions for the Proper Use of Hack Saw Blades", and on the bottom are "Cutting Instructions" for proper blade selection. These new boxes appeal to all who see them . . . they keep blades "right" until used and make a handy container afterwards for miscellaneous use around shop or home.
USA
VICTOR TUNGSTEN ALLOY BLADES


SUGGESTIONS FOR THE PROPER USE OF
PITCH OF TOOTH
SPEED OF BLADE
ALWAYS PLACE THE BLADE IN FRAME WITH TEETH POINTING AWAY FROM OPERATOR
VICTOR ALL HARD HAND BLADES
DESIGNED FOR THE USE OF SKILLED MECHANICS AND THE CUTTING OF ALL HARD MATERIALS
ORDER BY NUMBER TO AVOID ERROR
SELECT THE CORRECT BLADE FOR YOUR JOB:
WHEN CUTTING
VICTOR FLEXIBLE HAND BLADES
DESIGNED FOR THE USE OF PLUMBERS, ELECTRICIANS, GARAGE MEN, SHEET METAL WORKERS, ETC.

BETTER BOXES FOR THE BEST BLADES

Here's a combination that you can't beat: Victor "Moly" and Victor Tungsten Hand Hack Saw Blades . . . the blades that cut faster and last longer . . . in strong metal boxes. These new containers protect the blades, keeping them intact . . . they are easier to open . . . require less space . . . give quicker identification . . . are moisture and grease-proof . . . are adaptable to countless uses about shop and home after blades are used.

Victor again pioneers with these modern containers. Specify Victor . . . demand the blades in the modern metal box.

Savings all along the line with these better Broaches . . .

SAVINGS in unit production costs and tool changes because Connecticut Durakeen Broaches cut faster, and turn out MORE pieces per grind.

SAVINGS in tool costs because these broaches have far greater abrasion resistance and consistently average MORE grinds per broach . . . frequently reducing broach costs as much as 25% to 35%.

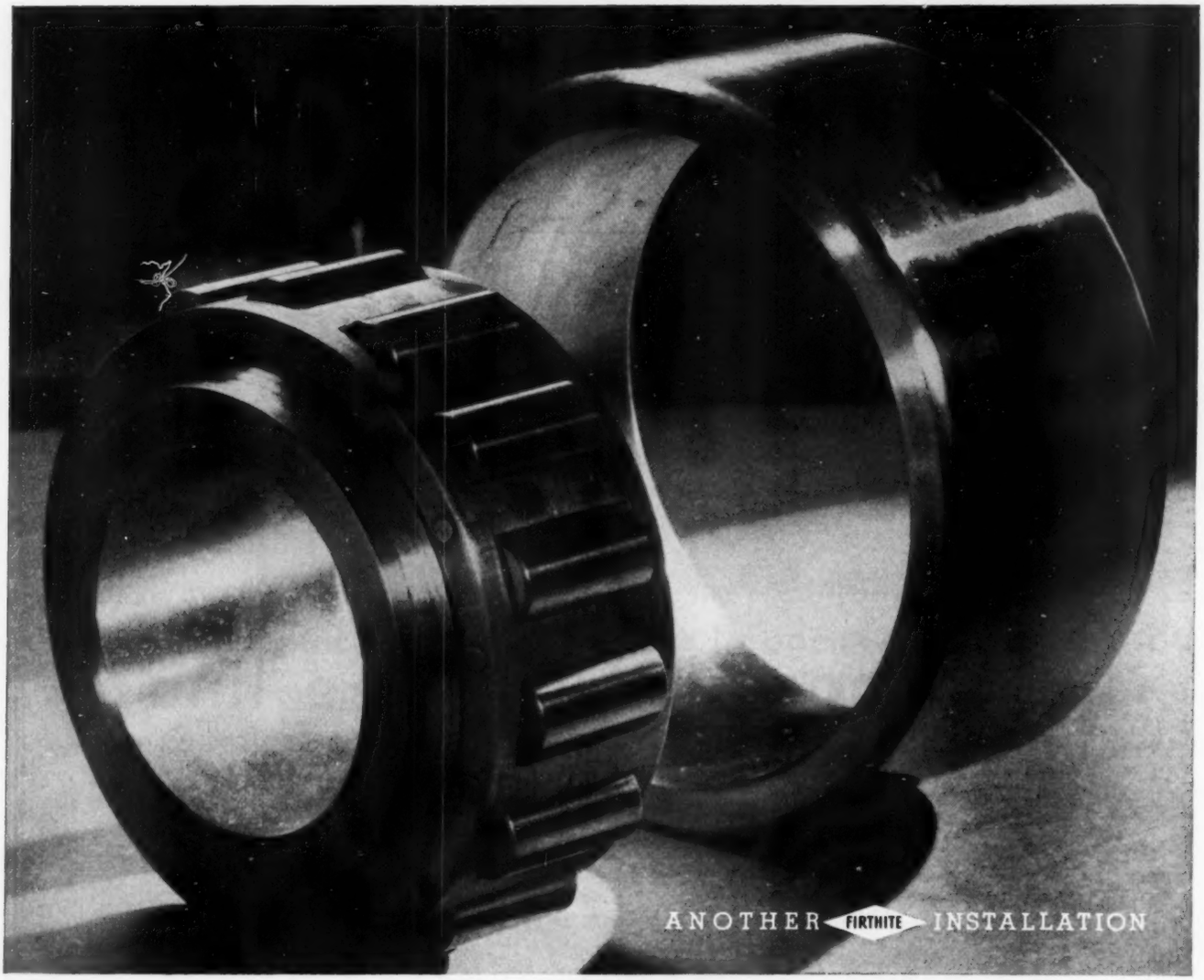
SAVINGS in the possibility of applying low-cost broaching methods to machining many of the new tough alloys, hitherto considered impossible to broach economically. Durakeen Broaches combine recent advances in tool-steel making with an improved heat-treating process that results in tools that are masters of the hardest steels.

Leading shops throughout the country report results that fully support these statements. They re-order Connecticut Durakeen Broaches again and again for just one reason . . . it pays. Send us your next broach blueprint. Make the test on your toughest broaching job.

Specify DURAKEEN BROACHES

THE CONNECTICUT BROACH AND MACHINE CO.
NEW LONDON · CONNECTICUT

FIRTHITE



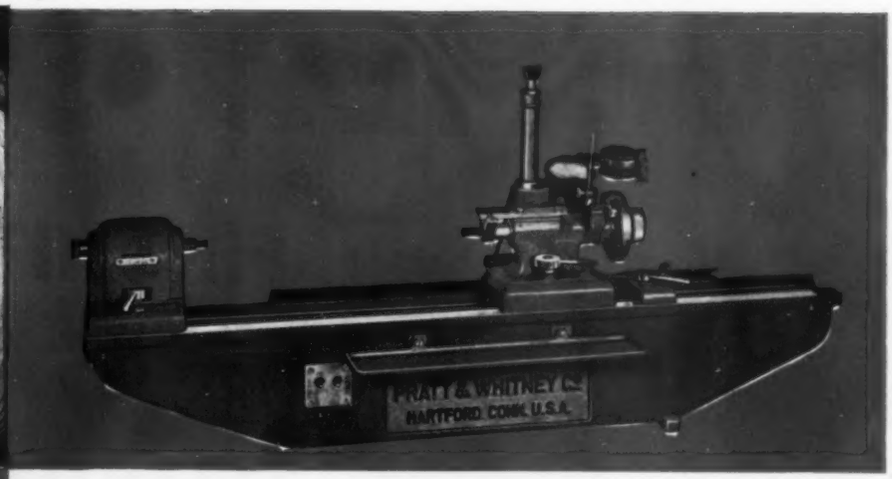
(Courtesy of Rollway Bearing Company)

Firthite increased production 100% on machining S. A. E. 52100 Chrome Bearing Steel used in the manufacturing of these 8" races.

Complete information sent on request.

FIRTH-STERLING STEEL COMPANY

Works: McKEESPORT, PA.
NEW YORK CHICAGO
HARTFORD PHILADELPHIA
LOS ANGELES DETROIT
CLEVELAND DAYTON
GLOBE WIRE DIVISION
McKEESPORT, PA.



P&W is Headquarters for Precision Gages

Pratt & Whitney gages and gaging systems can maintain accuracy throughout every step of your production on a low-cost basis. You—whoever you are and whatever you make—can use Pratt & Whitney gage accuracy to increase the marketability of your products—and your profits.

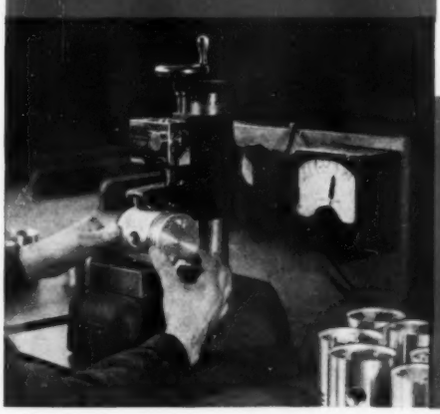
Only the gage specialist with a fully equipped laboratory and plant can give you the gage accuracy we guarantee. Use us, our men, our knowledge, and our experience for your own good. Install Pratt & Whitney methods for maintaining accuracy in your plant, because accuracy is the key to success in the metal working industry.

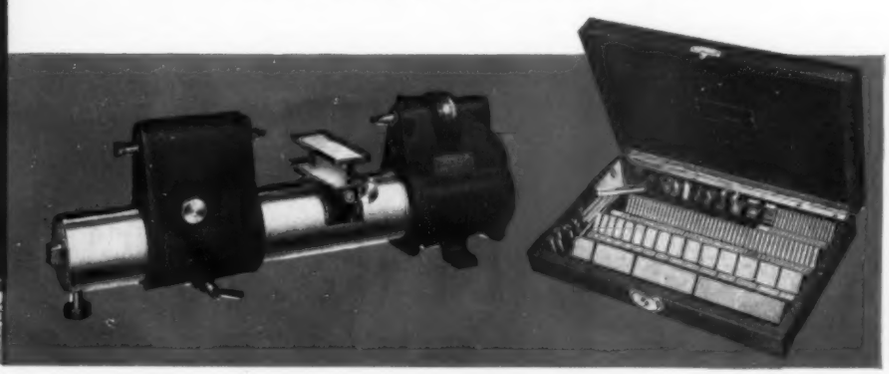
Call on us to show you how simply and at what low cost Pratt & Whitney gage accuracy will come and work for you. Tell us what you make, the quantity per day, month or year, and let our gage experts give you the simplest, cheapest way—the Pratt & Whitney way—to maintain your accuracy.

Pratt & Whitney

DIVISION NILES-BEMENT-POND CO.

HARTFORD, CONNECTICUT





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FIRTHITE-TUNGSTEN CARBIDE, made by Firth Sterling Steel Corp., is used for tipping this saw. For cutting non-ferrous metals, fibres, plastics, etc. Write for full information.

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Huther Bros. Patent Inserted Tooth Milling Saw with inserts of best quality High Speed Steel, the ideal saw for cutting brass, copper, and aluminum, leaves cut perfectly smooth —a real production tool. Saw has side clearance, sharpen on top of tooth only. Let us tell you more about this saw.

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HUTHER BROS. SAW MFG. CO.

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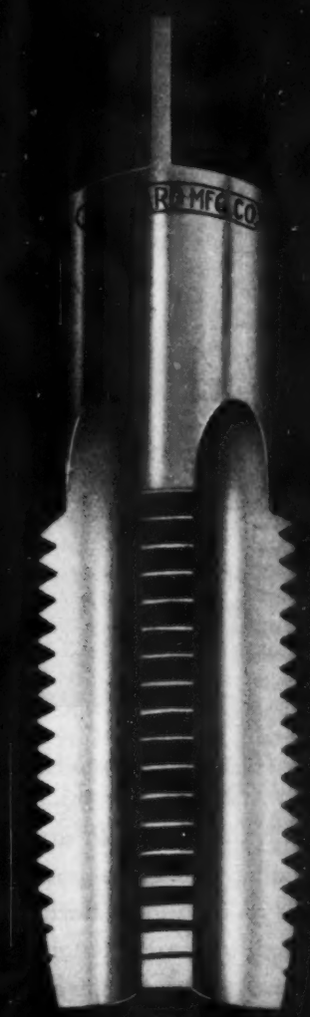

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ARE HARDENED, TEMPERED, TOUGHENED, **THEN GROUND FROM THE SOLID!**

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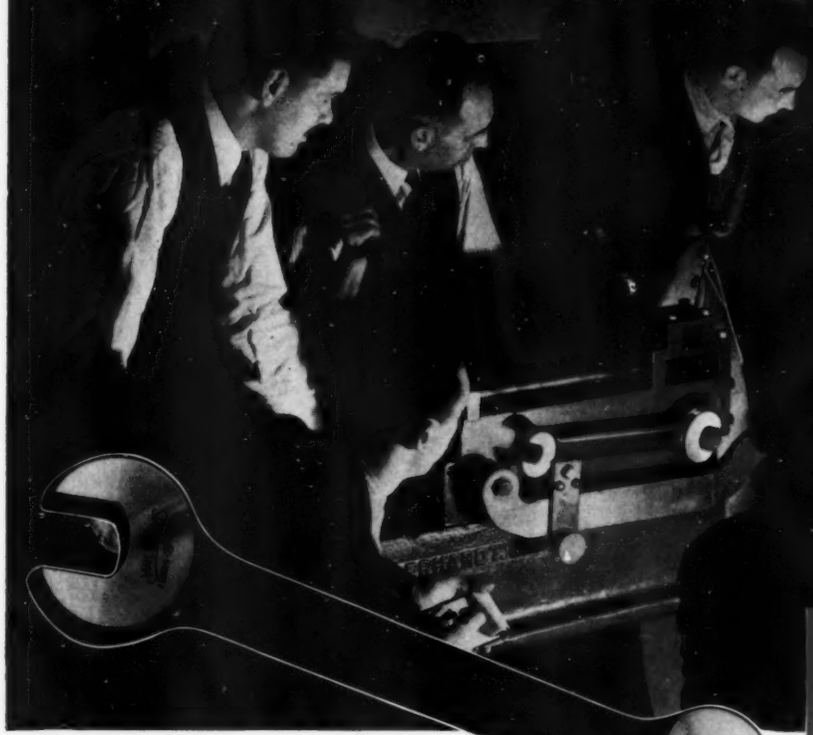

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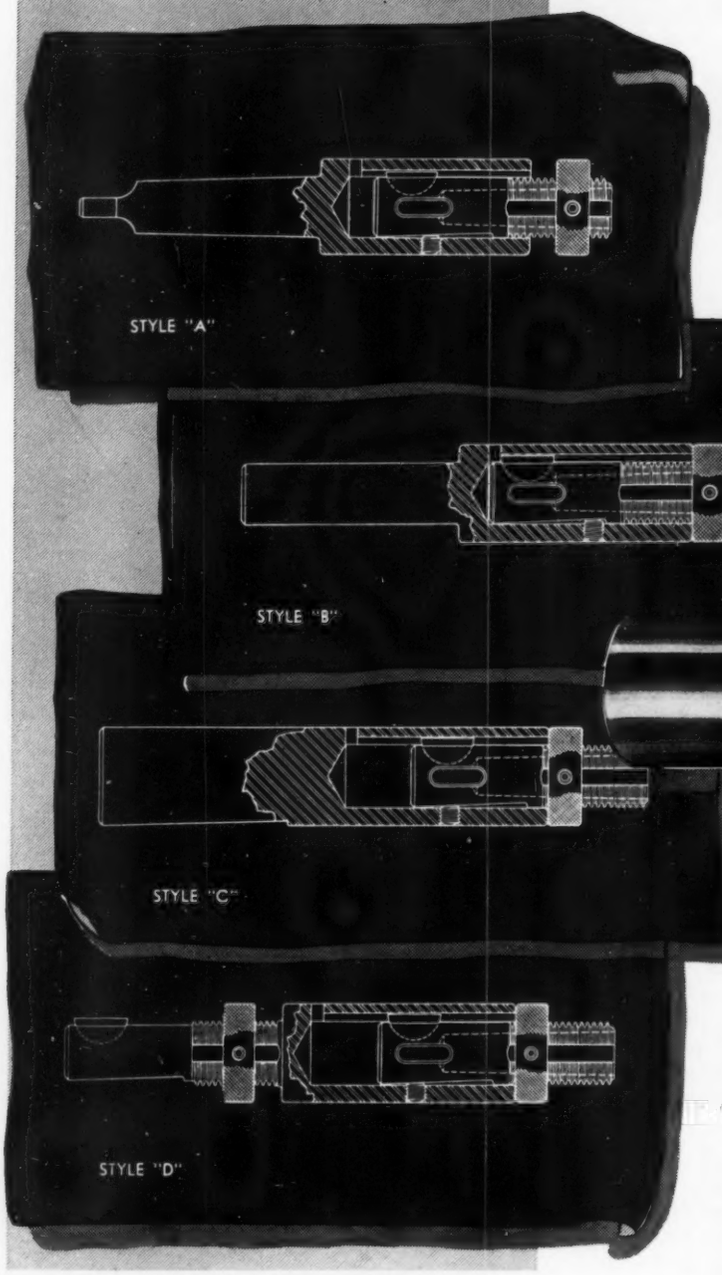
FOR *Quick* ADJUSTMENTS!



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The use of Adjustable Adapters permits a quick and easy adjustment of tools, in multiple spindle work, without disturbing the entire set-up . . . To lengthen or shorten assemblies, simply release the set screws in the nut and body, then turn the knurled nut to secure the correct adjustment.

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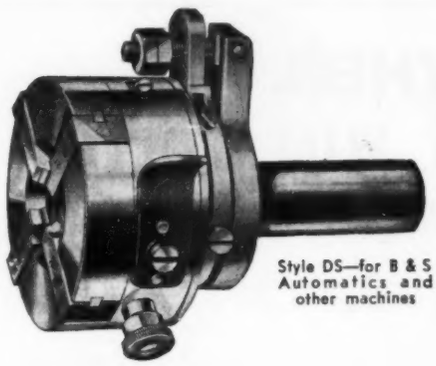
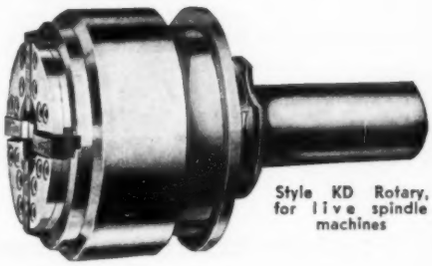
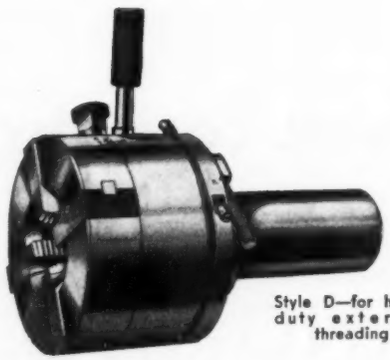


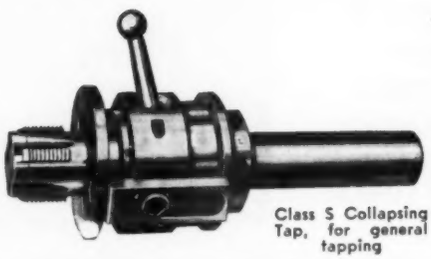
Style DS—for B & S Automatics and other machines



Style KD Rotary, for live spindle machines



Style D—for heavy duty external threading



Class S Collapsing Tap, for general tapping

Class SJ Solid Adjustable Tap

GEOMETRIC
THREADING TOOLS
—better threads, lower costs.

Clean, accurate threads at the lowest possible cost—that's what you want when you buy threading tools. And the simple, sturdy designs developed through more than forty years of specialization, with precision methods of manufacture and inspection, give you these qualities in Geometric tools.

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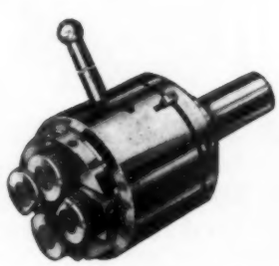
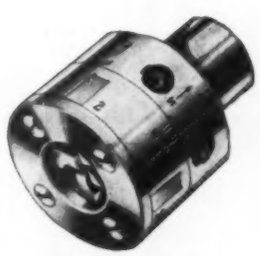


Style TH Stationary with circular chasers

Style TR Rotary with tangent chasers



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AND SAVINGS WILL FOLLOW

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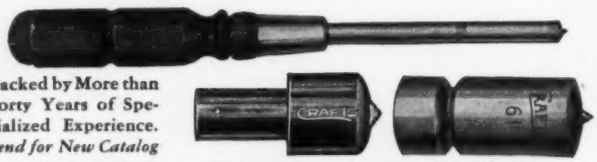
FOR SUPERIOR PERFORMANCE AT LESS COST
Standard or Special Applications



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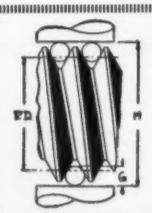

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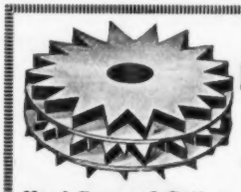

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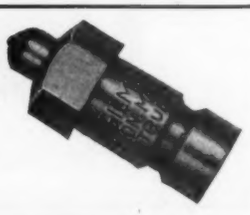

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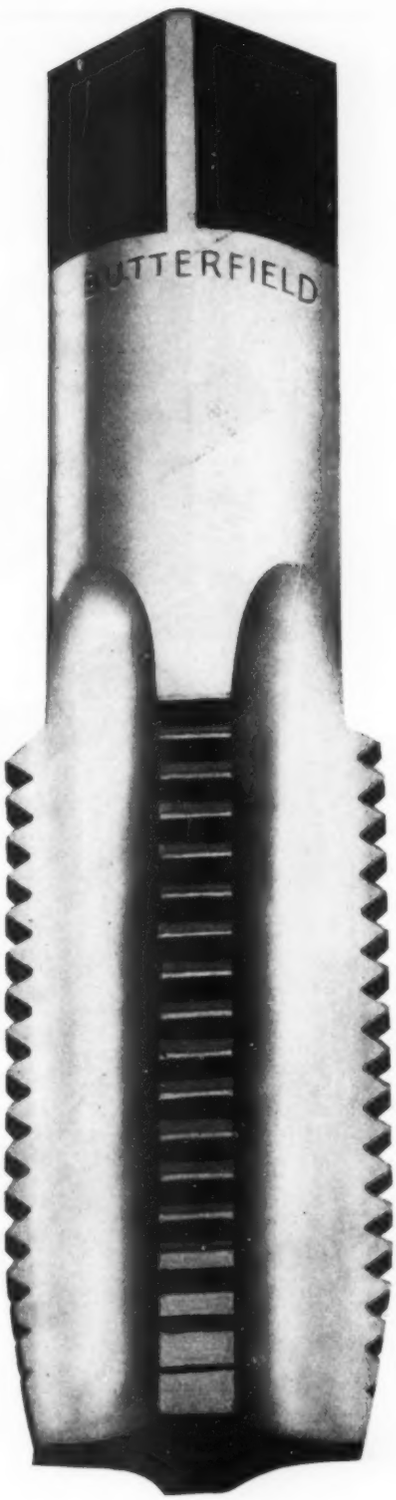

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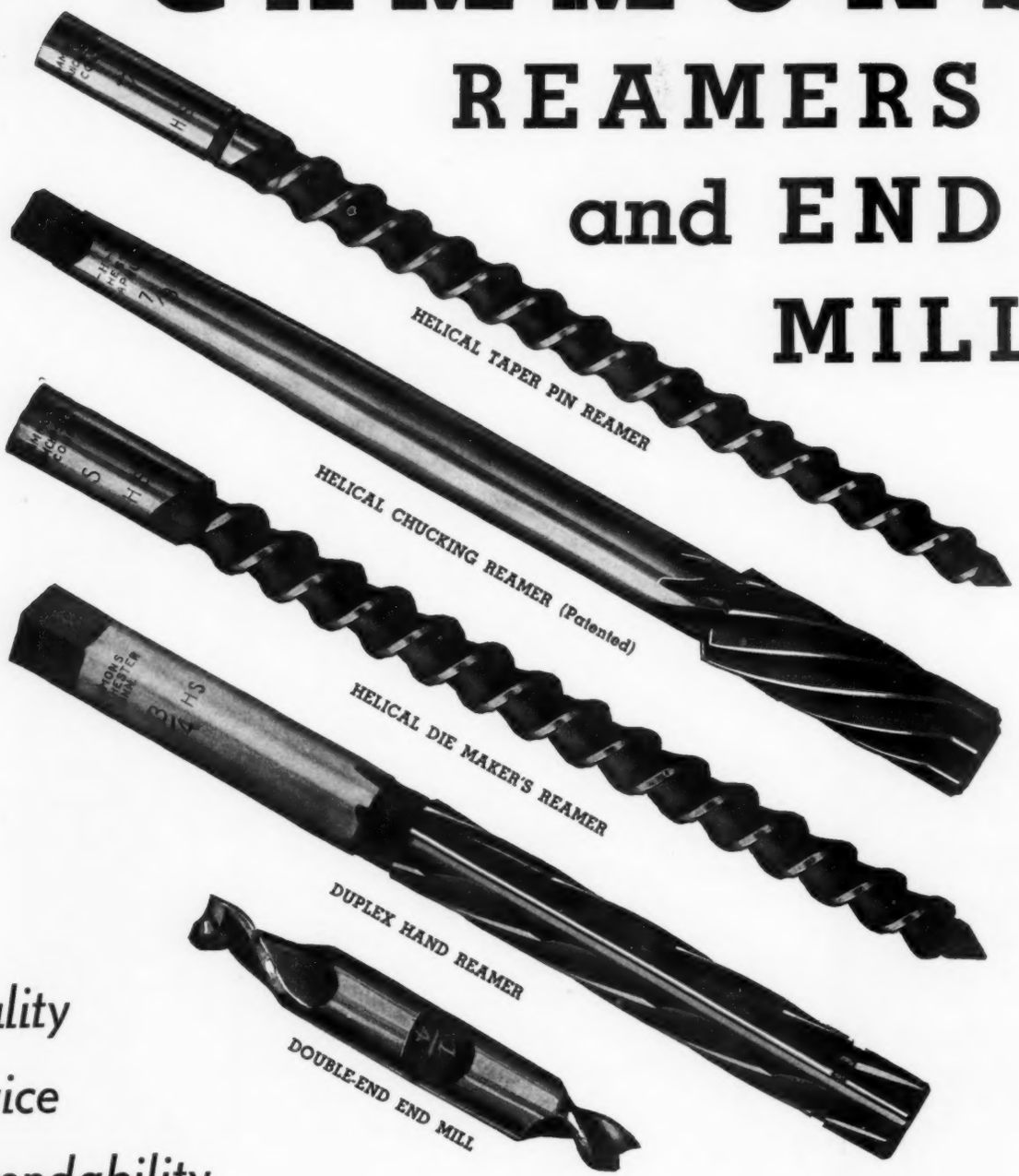

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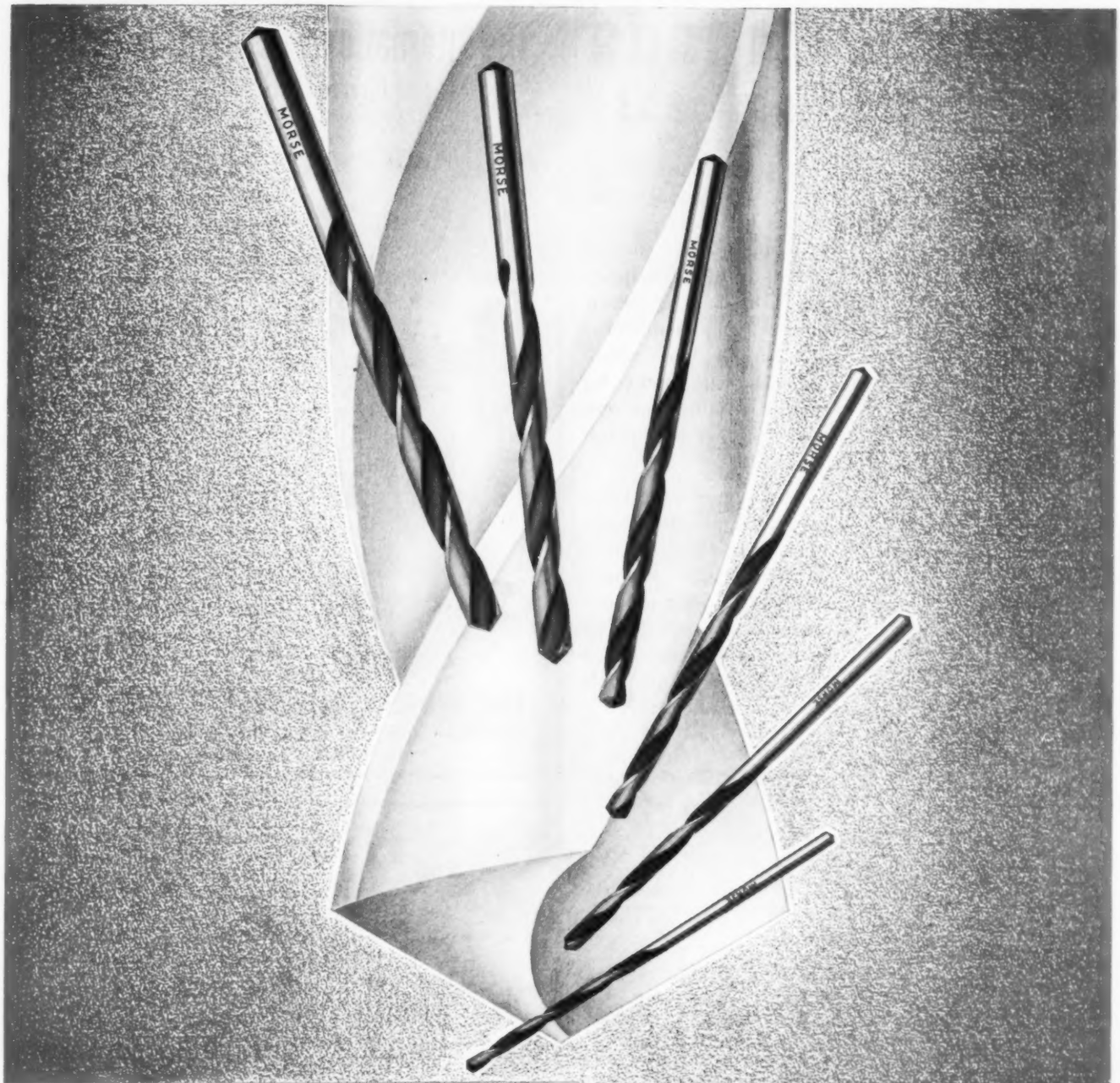

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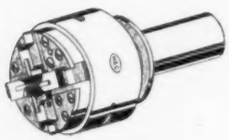
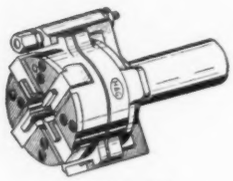
lower threading costs

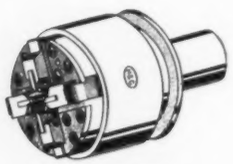


STYLE MM
for rotary spindles.

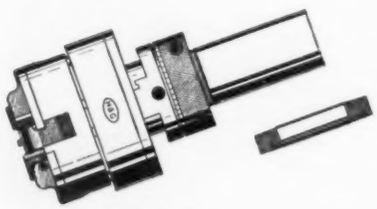


STYLE DM
for B&S Automatics and other small single spindles.

STYLE MS
for hand turret machines.



STYLE IMM
is equipped with improved internal trip for shoulder threading such as for spark plugs.



STYLE TM
has receding chasers for cutting superior quality taper pipe threads.

At the left are shown the sensational H&G INSERT Chaser Die Heads. Designed to lower threading costs and to simplify the cutting of screw threads. Recommended for high production where chaser expense must be kept to a minimum and net production to a maximum.

Below are shown the H&G General Purpose Die Heads. They are famous for their simplicity and strength and for the accuracy and long life of their hobbed chasers. Recommended for dependability on all kinds of screw thread cutting.

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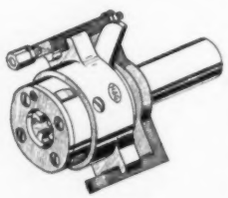
For automatics, threaders, etc., where the die head rotates.

STYLE C
Hand closing for hand turret machines.



STYLE D
For Brown & Sharpe Automatics and other small machines.

Write for literature on H & G Die Heads and Threading Machines

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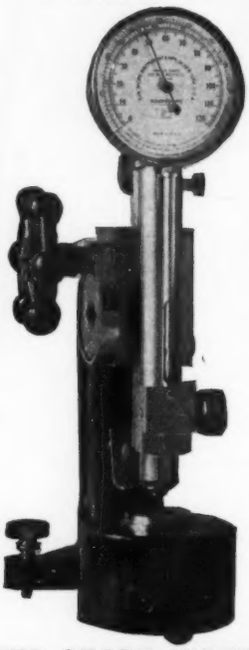
(Brinell-Shore)

Recording SCLEROSCOPE
Model D-1



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WINTER TAPS AND DIES

NOW! A MASTER PLANER GAGE by LUFKIN

Mechanics! You have needed an accurate Planer Gage! You have wanted one to do the jobs where ordinary planer gages fail. So Lufkin produced the Master Planer Gage.

Surfaces on all sides of this new gage are precisely ground. The slide travels in a ground and beveled slot, eliminating side play and assuring accuracy.

Here are only a few of the many uses for this outstanding tool:

As an adjustable parallel because of the extra long face on the slide.

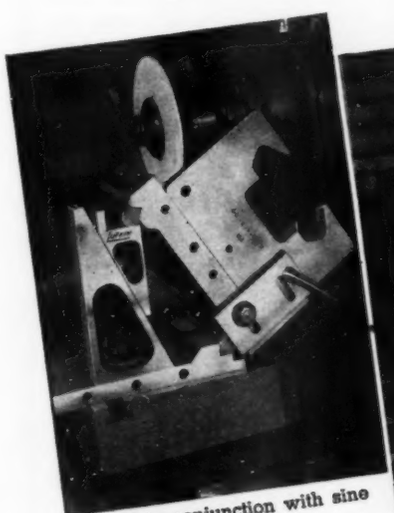
With a sine bar for grinding angles.

With gage blocks for building up work on a surface plate and for transferring measurements with an indicator.

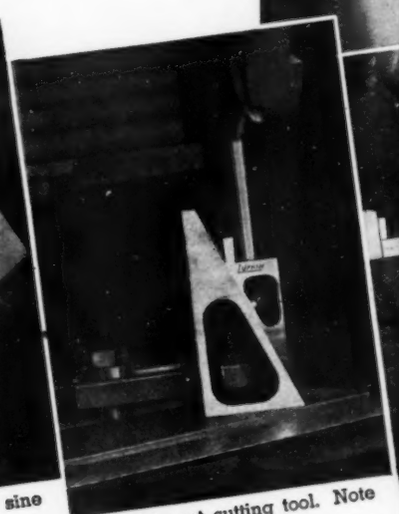
In fact, the new Lufkin Master Planer Gage can be used for countless jobs beyond the limits of all other planer gages.

It's no wonder that mechanics call it the precision tool of the year.

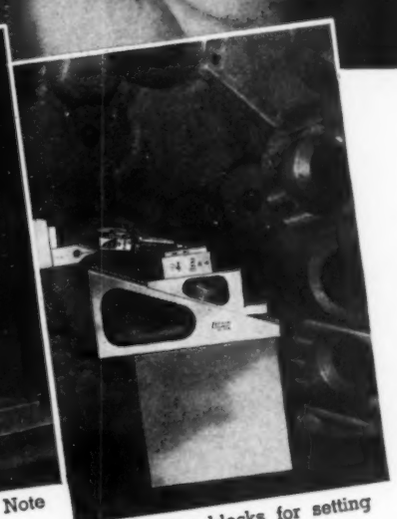
Your tool room equipment is not complete without this Lufkin Master Planer Gage.



Used in conjunction with sine bar for grinding angles.



Used to set cutting tool. Note use of extension bar.



With gage blocks for setting up work on a surface plate.

WRITE for our precision tool catalog No. 7A, illustrating and describing the new Master Planer Gage as well as all the other LUFKIN precision tools.

NEW YORK
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THE LUFKIN RULE CO.
SAGINAW, MICHIGAN

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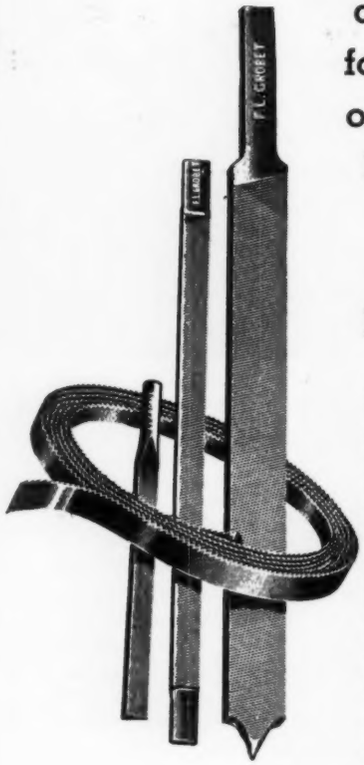
Important Tools for Precision Work

SMALL DIAMETER
FLAT DRILLS

A line of small flat drills made from high-speed steel that are guaranteed accurate as to dimensions and to be precisely centered. These drills are particularly adaptable for drilling injection nozzle inserts and similar small parts. Sizes range from 0.002 to 0.100 inches in diameter.



SWISS FILES and SAWS for all types of Precision Die Filing *and* Sawing Machines

Grobet Swiss Files are the "Original" Swiss Files and as such are standard precision tools. Grobet Files, for filing machines, are made of chrome steel assuring maximum hardness and are made in a wide variety of styles. Ask for catalogue DM.

Grobet Saws are made in both flexible and hard back types and in coil and blade styles. All are guaranteed to meet the high performance and precision standards for which all Grobet Tools are known.

Ask also for catalogue D illustrating more than 5,000 Swiss precision hand files made in 9 numbers of cuts — Nos. 00, 0, 1, 2, 3, 4, 5, 6, 8.

Grobet File Corp. of America
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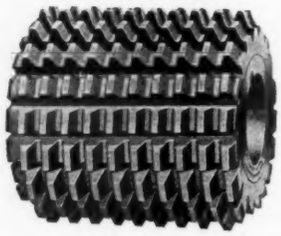
NATIONAL CLEVELAND



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GEAR SHAPER CUTTERS
SECTIONAL BROACHES

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"ROCKWELL" HARDNESS TESTER

SOUND fundamental principles, to which have been added convenience and great adaptability and finally true precision in manufacture, have placed this tester in so many heat treating rooms, shops, laboratories and tool rooms that its merits have been revealed by practical experience in thousands of plants.

WILSON MECHANICAL INSTRUMENT CO., Inc.
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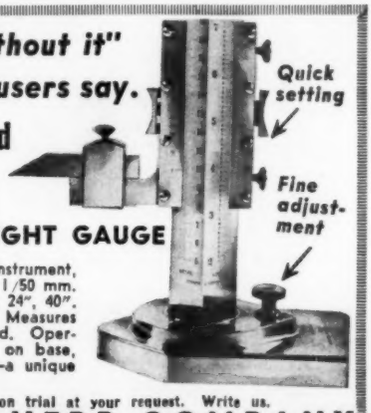
"Couldn't do without it"
many users say.

For accurate, rapid measuring, the

CHESTERMAN HEIGHT GAUGE



A big, strong, stabilized instrument, easy reading to 1/1000" or to 1/50 mm. Four sizes—measuring 12", 18", 24", 40". No "blocking up" needed. Measures depth, too—depth rod furnished. Operation of fine adjusting screw on base, aids in stabilizing the gauge—a unique and valuable feature.

Demonstrated or sent on trial at your request. Write us.

GEORGE SCHERR COMPANY
126 Lafayette St. New York, N. Y.

ACCURATE GRINDING
with Less Wheel Dressing

PRECISION work, such as pump-piston grinding, can be performed with high efficiency by use of Bakelite resinoid bonded wheels. Tough, even-wearing, cool-running and non-gumming, these wheels produce finer finish with less frequent dressing. For *non*-precision work, they permit higher safe speeds: up to 8,500 s. f. p. m. on snagging; up to 16,000 s. f. p. m. on cut-off. Write for booklet 14G, "High Speed Abrasive Wheels".

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West Coast . . . Electrical Specialty Co., Inc., 316 Eleventh Street, San Francisco, Cal.

BAKELITE

The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" in the monogram sign for infinite, or unlimited quantity, it symbolizes the infinite number of present and future uses of Bakelite Corporation's products.

BONDED WHEELS

FOR ECONOMICAL HIGH SPEED GRINDING

"GREENFIELD" TAPS DIES DRILLS SCREW PLATES PIPE TOOLS REAMERS GAGES SOLD BY DISTRIBUTORS EVERYWHERE

These three taps look exactly alike. *But each has a different pitch diameter tolerance.* For lowest ultimate cost per tapped hole, one of these taps is better for each one of your jobs than the other two.

The material being tapped, machine speed, depth of thread, assembly requirements, even the lubricant,—are a few of the factors that will dictate the right tap selection—and even then special grinding may be needed to give best results. *"Greenfield"* sales engineers are factory trained men with practical experience. They see that *"Greenfield"* customers get the *right* tap for the job.

A specific example of *"Greenfield"* research is the "Maxi" finish, a surface treatment for high speed taps which gives unusual efficiency in materials with abrasive or gritty characteristics, such as bakelite, fibre, malleable iron, die castings, etc. Send for this booklet.

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Forming

METAL FORMING machines, separated here from other metal-working equipment because of the ever growing importance of the group, include mechanical, hydraulic and pneumatic presses, shears and brakes, forming rolls and benders, forging machines and accessory heating equipment, die-casting and plastic molding units as well as spring making equipment. While plastic-molding machines are not, of course, metal-forming units, they are included in this section, because of the similarity of their design and operation with die-casting units.

Of the mechanical presses introduced this year, perhaps the most interesting is a unit employing an oscillating die synchronized with a continuous feeder. Blanking, piercing, progressive die work and shallow forming operations can be performed at 1,000 strokes per min.

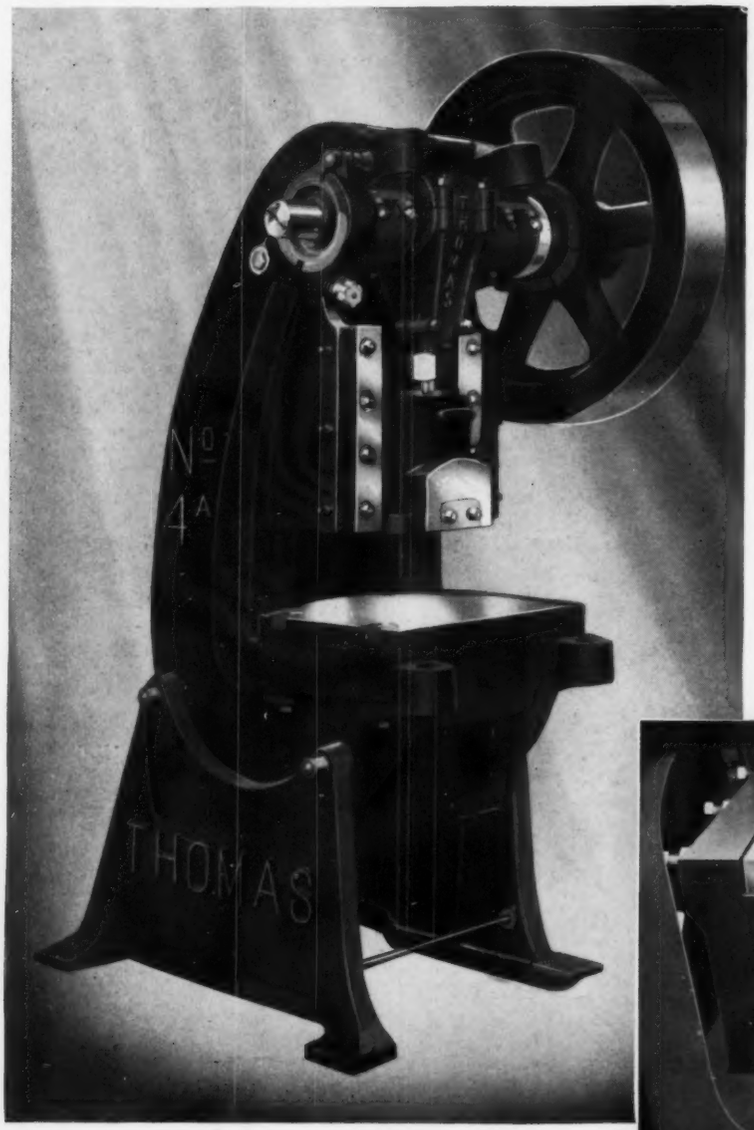
A line of open-back, inclinable punch presses having replaceable slide guides was announced late in the year. Slide is guided at both sides and at the rear. Seven sizes, with capacities, based on diameter of crankshaft, ranging from 10 to 78.7 tons are available. These presses feature a safety clutch which permits single-stroke, non-repeat or continuous operation.

Another interesting application is a turret-type plate punching machine rated at 75-ton capacity. An indexing worktable permits location of sheet in proper position under punch without preliminary layout. The operator is given a table of coordinates from which each hole is located and the proper punch and die combination is secured by rotating the turret. This unit will punch 5½x6 in. holes through ¼ in. thick steel sheet.

Die cushions continue to be improved, one of the latest being a hydro-pneumatic unit which makes possible the drawing of a 4¾-in. high shell in a single-action press. In its high range, this cushion is said to give about double the normal blank-holding pressure, adapting the unit to shape-forming jobs requiring a heavy gripping pressure around the edge of the blank.

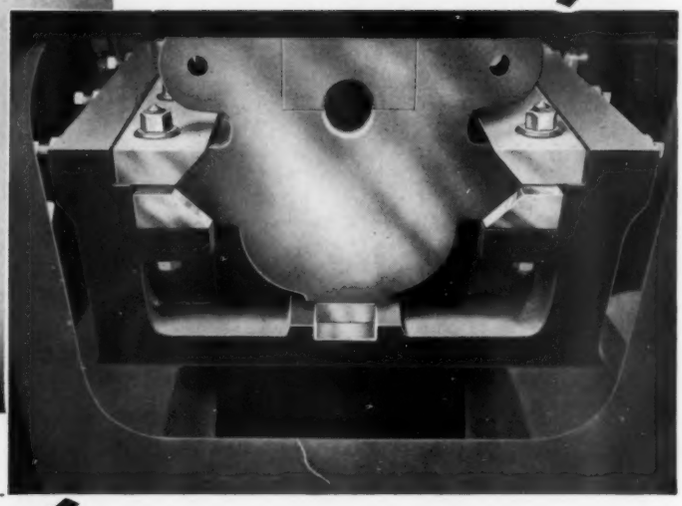
The 1,000-ton "Hydro-Dynamic" press offered during the past year provides three forward speeds, which include a high-speed positive advance of 1,100 in. per min. and an intermediate pressing speed of 60 in. per min. on capacities up to 250 tons. A slower pressing speed of 20 in. per min. is available for pressures exceeding 250 tons. When operating continuously with full-automatic control, this unit is capable of 16 cycles per min.

One of the largest hydraulic presses built during the past year was a 5,000-ton self-contained unit designed to shape parts for transport airplanes. The complete unit weighs 840,000 pounds. Hydraulic power is furnished direct to the press ram by four pumps. Speed and direction of ram movements are controlled by regulation of volume and direction of pump output, there being no intervening valves.



The New THOMAS Inclinable Power PRESS

with the exclusive



3-point Slide Alignment

In offering these new presses, Thomas introduces for the first time a revolutionary new development—the exclusive, patented three-point slide construction, which provides long-wearing three-point support for the slides and maintains more accurate alignment of dies. The hardened gibs are adjustable and easily replaced when worn. Alignment of slide is maintained even if gibs are improperly adjusted.

These and many other economy-promoting features make it imperative that you investigate the new Thomas Press before you buy.

The Only Press with All these features

- Accurate tool alignment
- Adequate Lubrication
- Low-Cost Maintenance
- Patented Safety Clutch of extremely simple Non-Repeat type; fewer parts
- Adjustable new three-point gibs with large wearing surface and permanent alignment of slides
- Semi-Steel Frame

Write at once for complete specifications

THOMAS
MACHINE MANUFACTURING COMPANY

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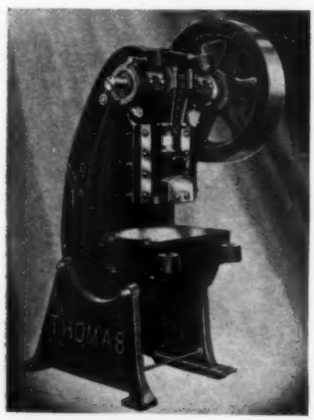
Mechanical Presses—Hydraulic Presses—Pneumatic Presses and Hammers—Shears and Brakes—Nibbling Machines—Forming Rolls and Benders—Forging Machines and Stock Heaters—Die Casting Machines—Plastic Molding Machines—Spring Making Machines

Presses, Inclinable, Series A

Thomas Machine Mfg. Co., Pittsburgh, Pa. (Vol.81,p.1284.)

Series A open-back inclinable punch presses feature a long-wearing 3-point support for the slide and adequate lubrication for the gibs. Wearing parts are adjustable and, when necessary, can be replaced without machining the frame. Slide moves vertically in double 45 deg. gibs of hardened steel.

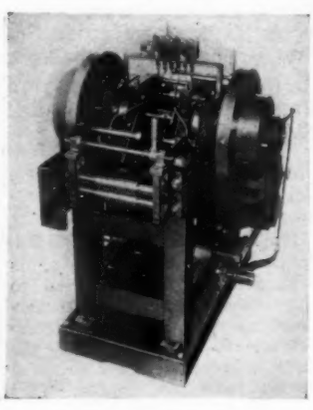


Safety clutch permits single-stroke, non-repeat or continuous operation at the will of the operator. All standard models can be inclined to 30 deg. Seven sizes are now listed, with rated capacity based on diameter of crankshaft, ranging from 10 to 78.7 tons. Standard stroke ranges from 1½ in. in the smallest size, up to 4 in.

Press, Punch, "Super Speed"

Super Speed Press Corp., 55 Liberty St., New York, N. Y. (Vol.81,p.873.)

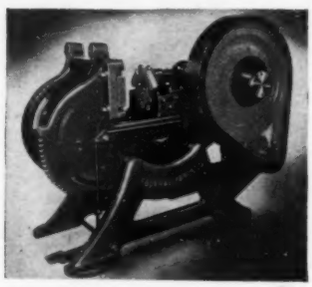
The "Super Speed" punch press operates at 1,000 strokes per min. This speed is accomplished by having an oscillating die synchronized with a continuous feeder. Machine is designed to do blanking, piercing, progressive work and shallow forming. Special dies are not needed and the press can be changed from one job to another in approximately twenty minutes.



Press, Inclinable, Open-Back

Federal Press Co., Elkhart, Ind. (Vol.81,p.23.)

A line of horizontal open-back inclinable presses, which are constructed along the same line as the regular Federal inclinable presses are specially adaptable for automatic feeds,

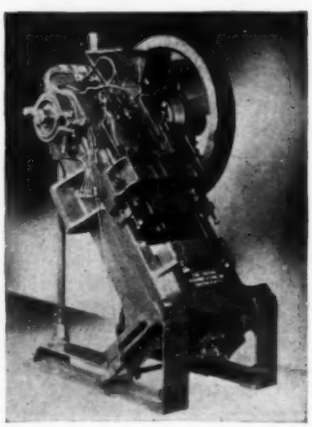


such as roll or pinch feeds. They are equipped with a non-repeat, sliding-key clutch mechanism.

Press, Inclined, Lamination, No. 54

Toledo Machine & Tool Co., 1420 Hastings St., Toledo, Ohio. (Vol.81,p.386.)

Design of the No. 54 straight-sided, single crank press makes

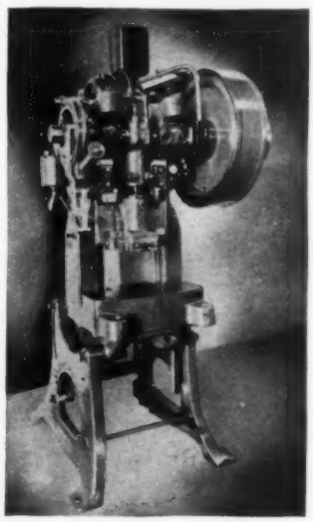


it adaptable for use with suitable compound dies in punching laminations from sheets previously blanked to size. A 3-hp. motor is required. Specifications: stroke, 2½ in.; distance from bed to slide, 13 in.; diameter of crankshaft at main bearings, 4 in.; ram strokes per min., 65 to 90. Fixed legs hold the press at an angle of 40 deg.

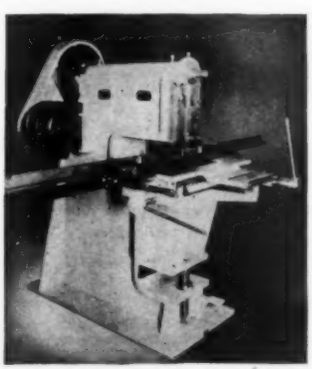
Press, Inclinable, High-Speed

V & O Press Co., Hudson, N. Y. (Vol.81,p.184.)

This high-speed inclinable press has approximately 30 tons capacity and operates at speeds



of 300 strokes per min. Brake is so arranged that when the treadle is released a cam holds the brake open until a switch disengages the clutch. When clutch is opened, brake is applied. Mechanical feeds can be fitted for high-speed operation.



Press, Punch, No. 23½, Deep-Throat

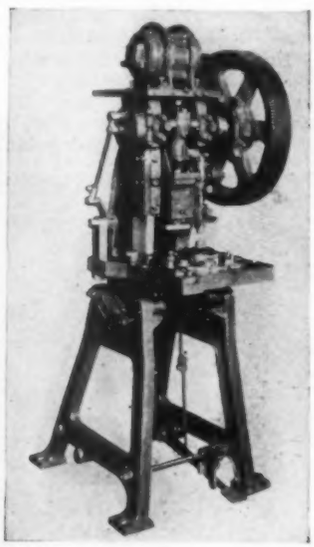
Service Machine Co., 754 Broadway, Elizabeth, N. J. (Vol.81.p.386.)

A light-weight series of deep-throat adjustable-bed power presses, having all steel welded frames and adjustable knee beds, is now available. Model No. 23½ unit shown has a nibbling attachment with operating speeds up to 175 strokes per min. Eccentrics are readily changed, so that the stroke of the press can be varied.

Press, No. 34, For Etching Parts

Toledo Machine & Tool Co., 1420 Hastings St., Toledo. Ohio. (Vol.81,p.808)

This No. ¾ open-back, inclinable press has been adapted for etching, with acid, a trade-

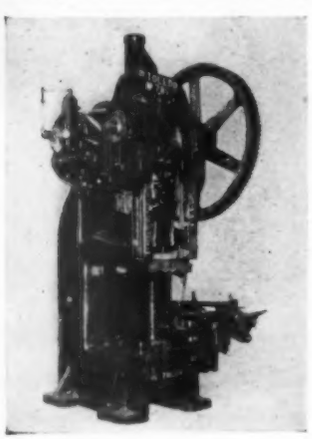


mark and number on hardened steel parts. Attached to the slide is a rubber-stamp die which is rotated 180 deg. at each stroke of the press. An eight-station dial feed carries the parts and one piece is etched for each stroke of the press.

Press, Automatic-Feed, Open-Back, No. 79½

Toledo Machine & Tool Co., 1420 Hastings St., Toledo, Ohio. (Vol.81,p.1166.)

An electric pushbutton control, requiring the operator to keep both hands on palm buttons until completion of the working portion of the stroke, is featured in the No. 79½ open-back press. This press has a single-roll feed with a seven-roll, power-driven straightener

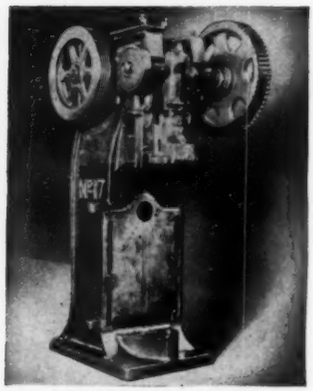


to provide an automatic feed for stock from 0 to 12 in. Specifications: stroke, 12 in.; adjustment of stroke, 3 in.; distance from bed to slide, stroke down and adjustment up, 20 in.; bed area, front to back by right to left, 28x41 in.; area of flanged slide, 24x 28 in.

Press, Horn Type, No. 17

Niagara Machine & Tool Wks. 637-697 Northland Ave., Buffalo, N. Y. (Vol.81,p.628.)

No. 18 horn press has a 4-in. shaft mounted in bearings split at an angle of 45 deg. Included in the design are a cast-steel frame, a fourteen-point

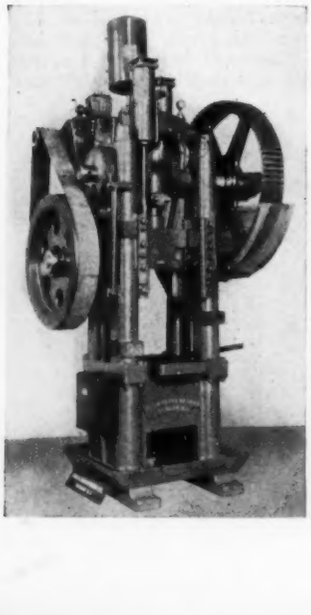


engagement, sleeve clutch with a built-in single-stroke mechanism, double V-gibs, a rigid slide with breech-block die clamp, and a self-contained back-gear assembly.

Press, Straight-Side, 75-Ton

Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J. (Vol.81,p.1233.)

This straight-side press, of built-up tie-rod construction, has a capacity of 75 tons and a maximum stroke of 12 in. Bed area, front to back and right to left, is 20x19 in. It is equipped with balancing



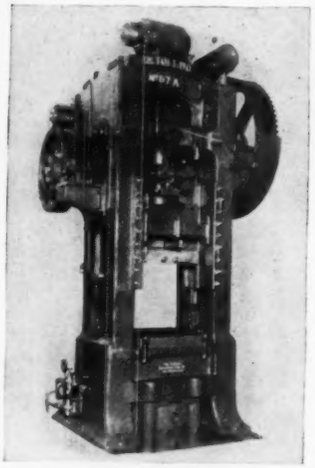
cylinders for the slide, force-feed lubrication, roller bearings and individual motor drive. Net weight, 11,000 lb.

Press, Single-Action, No. 57-A

Toledo Machine & Tool Co., 1420 Hastings St., Toledo, Ohio. (Vol.81,p.1116.)

The No. 57-A single-action general-purpose press is fitted with a semi-built-in, heavy-duty "Marquette" hydro-pneumatic die cushion. In its high range, this cushion gives about double the normal blank-holding pressure, adapting the unit to shape-stretching jobs requiring a heavy gripping pressure around the edge of the blank. Press is of the double-geared, single-end drive, single-action type having a speed of 22 strokes per min. Electric push buttons control the multiple-disk, air-operated friction clutch.

Specifications: stroke, 10 in.; shut height from bed to slide, stroke down and adjustment up, 20 in.; diameter of

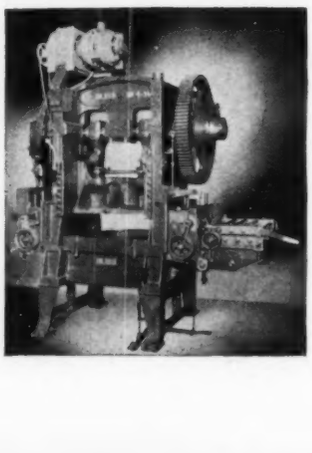


crankshaft at bearings, 6½ in.; diameter of crankshaft at pins, 9¾ in.; size of bed, 32x32 in.

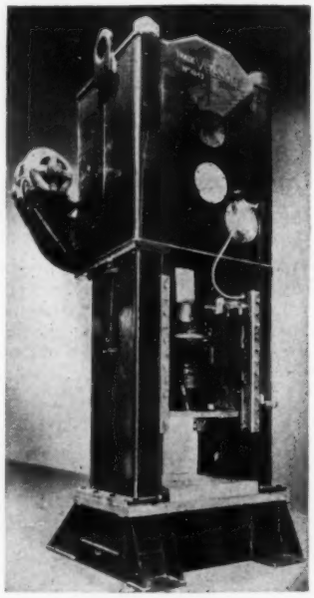
Press, Blanking, High-Speed, No. 4

E. W. Bliss Co., 53rd St. & 2nd Avenue, Brooklyn, N. Y. (Vol.81,p.384.)

Although single geared, the No. 4 high-speed automatic



blanking press will operate at from 30 to 90 strokes per min. through a variable-speed drive. Specifications: stroke, 1½ in.; adjustment, 3 in.; shut height of bed to slide, with stroke down and adjustment up, 11½ in.; slide area, 28x31 in.; bed area, 34x35½ in.; diameter of crankshaft at bearings, 4 in.; distance between uprights, 36 in. A high-speed, double-roll feed with a seven-roll driven straightener and a shear-type scrap cutter is mounted on the press.



Presses, Single-Crank, "Verson"

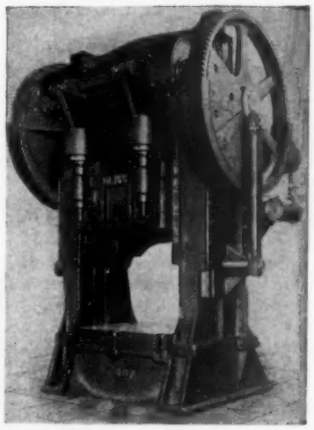
Verson Allsteel Press Co., 12015 Peoria St., Chicago, Ill. (Vol. 81,p.344.)

Crankshaft is eliminated entirely from the design of the "Verson" line of single-crank, full eccentric, front to back presses. Crank motion is obtained by means of an integral eccentric and gear which rotate on the main shaft. These presses are equipped with an air or hydraulically operated clutch and brake.

Press, Toggle-Type, Double-Action

E. W. Bliss Co., 53rd St. and Second Ave., Brooklyn, N. Y. (Vol.81,p.811.)

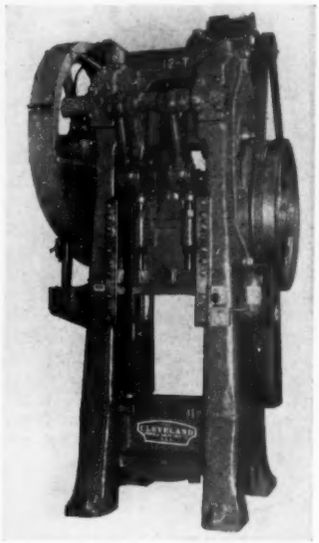
No. 407 double-crank, double-action, straight-side toggle drawing press is a long-stroke model having a frame made of four separate castings held together by shrunk-in steel tie-rods. Control is completely electric, with pushbuttons to start, stop or inch the press. Clutch is full-automatic. Press provides positive gripping for stretching jobs with draw beads and can draw a shell 10 in. deep. Specifications: plunger stroke, 21 in.; blank-holder stroke, 14 in.; shut height, bed to blank-holder, stroke down and adjustment up, 34 in.; thickness of bolster, 6 in.



Press, Double-Action, Single-Crank, No. 12-T

Cleveland Punch & Shear Works Co., 3900 St. Clair Ave., Cleveland, Ohio. (Vol.81,p. 1286.)

An electrically-controlled, hydraulically-operated friction clutch is featured on the No. 12-T single-crank, double-ac-

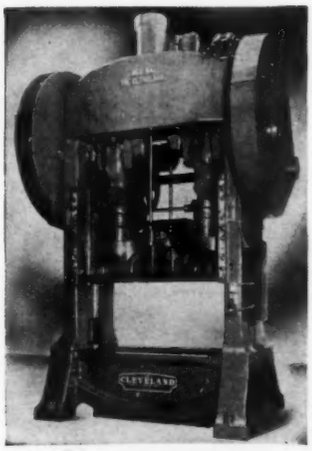


tion toggle press. This machine is designed for economical use of floor space, with gearing, clutch and component parts located between the uprights. Bed area measures 28x 26 in. and stroke is 20 in. with a 4 in. adjustment.

Press, Double-Crank, No. 80-D-84

Cleveland Punch & Shear Wks. Co. 3900 St. Clair Ave., Cleveland, Ohio. (Vol.81,p.344.)

No. 80-D-84 straight-sided, double-crank press shown is arranged with twin drive to the crankshaft through herringbone gears. Air counterbalance is provided for the slide, which is power-adjusted by an individual motor. This

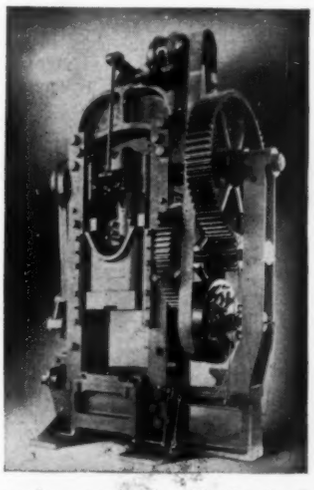


press is equipped with an electrically controlled hydraulic clutch, having a four-station selector for momentary, continuous and inching operations.

Press, Trimming, 300-Ton

Chambersburg Engineering Co., Chambersburg, Pa. (Vol.81,p. 222.)

This 300-ton double geared trimming press has an air-operated clutch that provides easy control of the machine and a safety slip in the event of ex-



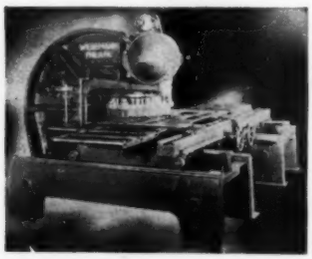
cessive overload. Stroke is 8 in. and adjustment is 5 in. Specifications: bolster, left to right, 37 in.; bolster, front to back, 40 in.; ram face, left to right, 30 in.; ram face, front to back, 30 in.; distance between frames, 40 in.

Punching Machine, Plate, Turret-Type

Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa. (Vol.81,p.586.)

Model R-7 turret-type plate punching machine, is similar in design but of larger capacity than standard turret units. It is equipped with an indexing work table which holds the sheet in position and locates it in a predetermined position under the punch. All the operator does after locating a sheet is to move the table according to ordinate dimensions given for each punched hole.

The Model R-7 press is rated at 75-ton capacity, has a 54 in. throat and a 50 in. diameter turret. Turret has provision for carrying 32 die units and



will punch 5½x6 in. holes through ¼ in. thick material. A smaller press, designated as the Model R-6, is rated at 40 tons, has a 30 in. throat, a 30 in. turret, and has provision for 28 punch stations. This press will punch 2½ in. diameter through ¼ in. thick material.

Punch, Washer

Ideal Commutator Dresser Co., 1439 Park Ave., Sycamore, Ill. (Vol.81,p.593.)

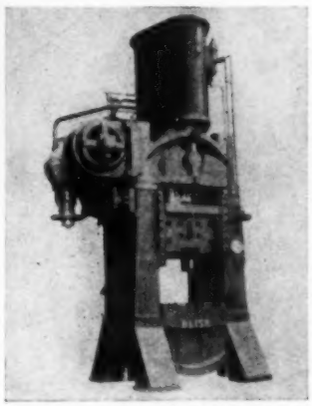
Intended for use in punching fiber, steam packing, straw board, asbestos, leather, felt, cork, rubber, bakelite, mica and similar materials up to $\frac{1}{16}$ in. thick, this washer punch has

18 hardened dies, ranging from ⅛ to 1⅜ in. diameter. It is possible to obtain over 150 different washer combinations.

Press, 1,000-Ton, "Hydro-Dynamic"

E. W. Bliss Co., 53rd St. & Second Ave., Brooklyn, N. Y. (Vol.81,p.1161.)

The 1,000-ton "Hydro-Dynamic" press features heavy-frame construction, adjustability of stroke and finger-tip control. Side frames are keyed to the crown and bed so that the housings, rather than the tie rods, take any torsional strain. The three forward speeds include a high-speed positive advance of 1,100 in. per min. and intermediate pressing speed of 60 in. per min. on pressure capacities up to 250 tons, and a slower pressing speed of 20 in. per min. on pressure capacities over 250 tons. Specifications: maximum length of stroke, 15 in.; die-space, 20 in.; bed area, front to back by right to left, 42x43 in.; area of slide face, 37x37 in.; diameter of cushion pad in bed, 27 in.; stroke of cushion

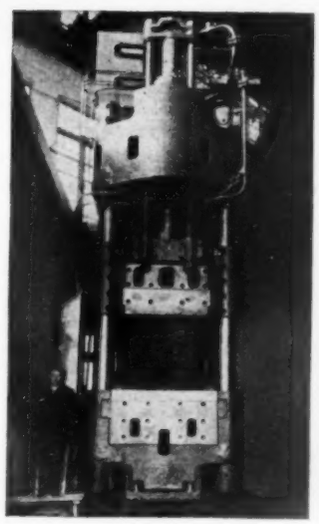


pad in bed, 7½ in.; speed of press when operating continuously with full-automatic control, 16 cycles per min.

Press, Hydraulic, 2,000-Ton

Farrel-Birmingham Co., Ansonia, Conn. (Vol.81,p.219.)

Five railroad cars were required to transport this self-contained hydraulic forming press to the plant of the Lockheed Aircraft Corp., at Burbank, Calif., where it was installed for blanking and forming duralumin aircraft parts. The press stands nearly 26 ft. high and weighs 175 tons. It occupies only 120 sq.ft. of floor space. A maximum pressure of 2,000 tons is exerted under a hydraulic pressure of 2,300 lb. per sq.in. Clear space between tie rods is 61 in. wide by 97 in. long. Bottom crosshead and moving platen are

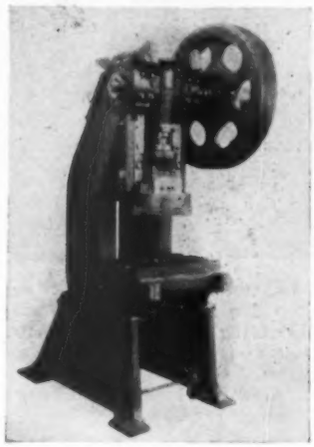


96x133½ in. Maximum opening is 60 in. and maximum stroke is 36 in.

Cushion, Slide, Pneumatic

Marquette Tool & Mfg. Co., 1420 Hastings St., Toledo, Ohio. (Vol.81,p.1117.)

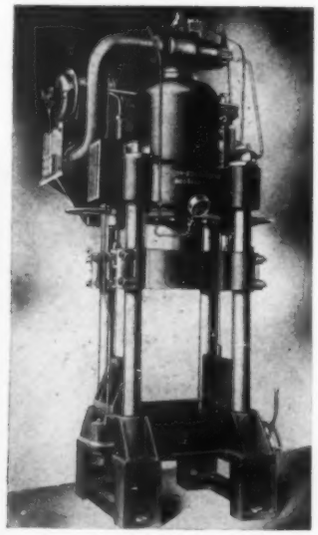
This compact pneumatic slide cushion, shown here mounted on the slide of a No. 21-B Bliss punch press, can be used in conjunction with "Calleson" blanking, drawing and curling dies to replace the springs or rubber cushions. They are also adaptable to stripping and blank-holding operations of various types. A single-action press can be converted into a triple-action press through the



use of one of these slide cushions and the installation of regular bed-type cushions.

Press, Hydraulic, Rapid-Action

Watson-Stillman Co., Roselle, N. J. (Vol.81,p.423.)



Designed for metal forming and straightening operations, this 400-ton rapid-acting hydraulic press operates under a hydraulic pressure of 2,500 lb.

per sq. in. Main ram and moving platen are advanced and returned at high speed by means of two double-acting cylinders, high pressure being automatically admitted when the moving platen reaches the work.

Cushion, Die, Pneumatic

Dayton Rogers Mfg. Co., 1845 E. Franklin Ave., Minneapolis, Minn. (Vol.81,p.715.)

Especially designed for inclinable presses, the Model A pneumatic die cushion is available in seven sizes, with drawing capacity ranging from 2½ to 5 in. This model includes a

hand-wheel and hand-wheel stop for adjusting and predetermining the height of the piston pressure plate at all times. Cushions will produce a draw-ring holding pressure from ¼ to 8 tons.

Press, Hydraulic, Metal-Forming, 500-Ton

Farrell-Birmingham Co., Inc., Ansonia, Conn. (Vol.81,p.466.)

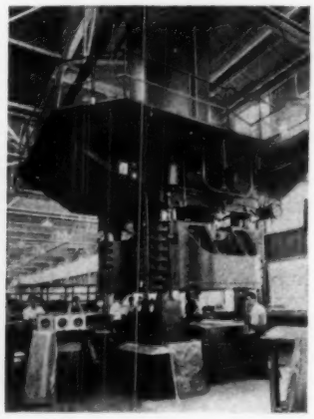
This hydraulic, metal forming press has a maximum capacity of 500 tons under a hydraulic pressure of 2,250 lb. per sq.in. on a 24 in. diameter ram. Clear space between tie-rods is 61 in. wide by 90 in.

long. Overall dimensions of the bottom crosshead and of the moving platen are 80x126 in. Maximum opening is 60 in. and maximum stroke is 36 in. Closing speed is variable from 1 to 110 in. per min. and pressing speed ranges from 1 to 10 in. per min. Return speed is 100 in. per minute.

Press, Hydraulic, 5,000-Ton

Hydraulic Press Mfg. Co., Mount Gilead, Ohio. (Vol.81, p.864.)

This 5,000-ton self-contained hydraulic press, operated by the "Fastraverse" hydro-power

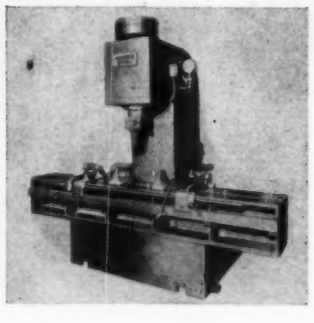


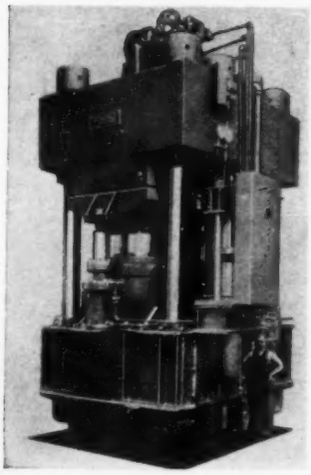
system, is being used to shape parts for Douglas commercial transports. Complete press weighs 840,000 lb. and maximum opening between platen and bed is approximately 4 ft. Hydraulic power from four pumps is directly applied, without intervening valves, to the press ram. Speed and direction of press movements are controlled by regulation of the volume and direction of pump output.

Press, Hydraulic, Straightening, 35-Ton

Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill. (Vol.81, p.861.)

This 35-ton sensitive hydraulic press, especially designed for straightening operations on heavy crankshafts, has single-lever, sensitive proportional control. When control lever is moved in either direction the ram will move a proportional distance under full pressure and then stop. Specifications: maximum capacity, 35 tons; stroke, 6 in.; ram speed down, 53 in. per min.; ram speed up, 77 in. per min.; distance from table to ram, ram up, 20 in.





Press, Hydraulic, 4,000-Ton

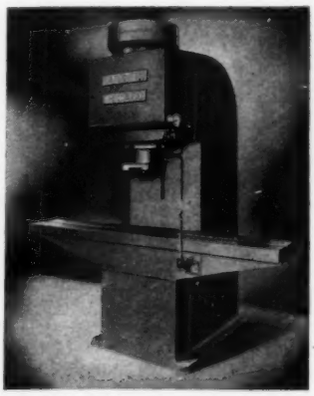
A. B. Farquhar Co., Ltd., York, Pa. (Vol.81,p.996.)

Of heavy construction to minimize deflection, this 4,000-ton hydraulic press has an overhead tank for pre-filling the main cylinders. Side rams are double acting and are used for quick closing and opening. Specifications: size of platens, 51x132 in.; size of opening, 14 in.; diameter of two main rams, 36 in.; maximum deflection of the press, 0.005 in.

Press, Hydraulic, Straightening, 75-Ton

Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill. (Vol.81, p.185.)

This 75-ton sensitive hydraulic straightening press has been designed for straightening operations on airplane propellers and similar work. A single lever controls the entire operation of the ram with a sensitive proportional control action. Ram stroke is 12 in.

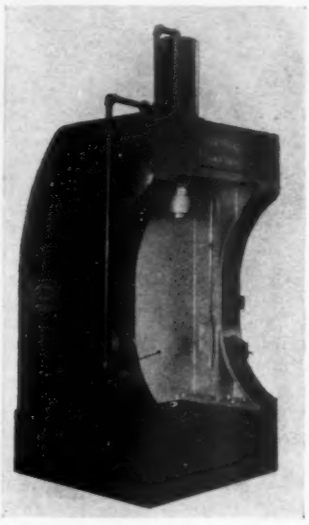


Speeds are 24 in. per min. power stroke and 40 in. per min. return.

Press, Hydraulic, Assembling

Colonial Broach Co., Detroit, Mich. (Vol.81,p.872.)

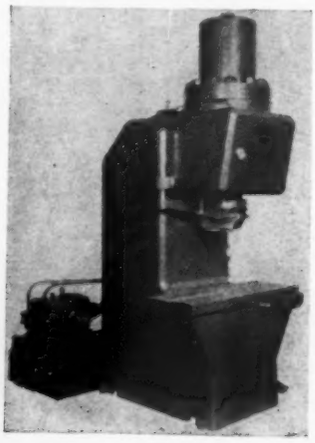
Designed for automotive assembly work, this 50-ton down-acting hydraulic press is a self-contained unit of welded-steel construction. Stroke is 18 in. and operating pressure is furnished by a 1,000 lb. pressure pump. Platen is 36 in. square.



Press, Hydraulic, Straightening

The Oilgear Co., 1319 W. Bruce St., Milwaukee, Wis. (Vol.81, p.1228.)

Large front axle I-beams for heavy trucks and buses are straightened on this 200-ton gooseneck straightening press. Sensitive control of the vari-

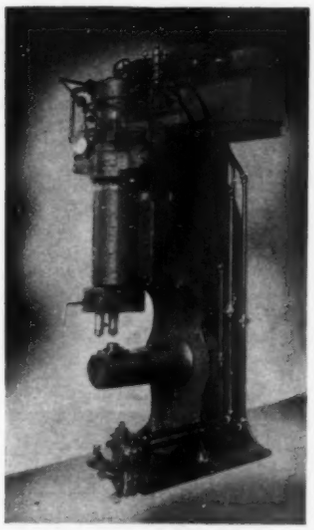


able ram movement is claimed to enable the operator to bring the ram into contact with the work without impact and to deflect the piece to the desired amount without overrunning. Both the speed and the stroke of the ram can be preset, or selected at will from zero to maximum.

Press, Hydraulic, Spud, 75-Ton

Chambersburg Engineering Co., Chambersburg, Pa. (Vol.81,p. 422.)

Designed for inserting and closing 1-in. boiler spuds in

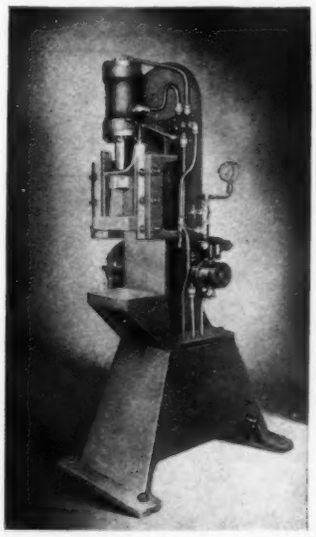


two operations on 12- to 24-in. diameter boilers, this 75-ton hydraulic downward - acting press is provided with a 6-in. stroke and a 16-in. open space between face of ram and horn at top of stroke.

Press, Hydraulic, Arbor

Greenerd Arbor Press Co., Nashua, N. H. (Vol.81,p.223.)

The No. 57 hydraulic press may be stopped at any point of the stroke in either direction at the will of the operator. Specifications: pressure on down stroke, ½ to 6 tons; pressure on up stroke, 3 tons;



stroke of ram, 5 in.; ram speed down, 240 in. per min.; ram speed up, 336 in. per min.

Press, Hydraulic, Special

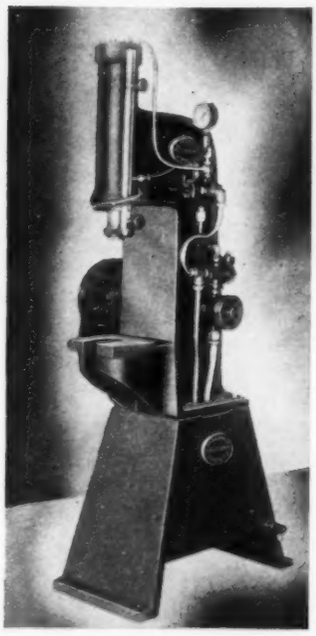
Chambersburg Engineering Co., Chambersburg, Pa. (Vol.81,p. 305.)

This 5-ton capacity hydraulic press was designed to enable manufacturers of anti-friction bearings to measure bearings under varying predetermined loads; thereby accurately calibrating the assemblies so that the desired preload will always be obtained in service. On top of the press is a spindle rotating at 10 r.p.m., driven by a ¼-hp. motor through V-belts. This spindle is raised and lowered by a counterbalanced handwheel; it can be locked in position when test bearings are in place.

Press, Hydraulic, Arbor

Greenerd Arbor Press Co., P. O. Box 415, Nashua, N. H. (Vol.81,p.813.)

Rams of these 2- and 4-ton hydraulic arbor presses are put into motion by hand lever control. Pressure will remain on



the work until the lever is released, which automatically returns the ram to a power stop. Stop may be set at any predetermined point within the 16-in. stroke of the ram.

Press, Hydraulic, Portable, "Hy-Power"

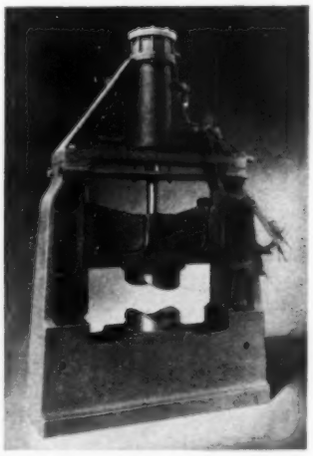
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill. (Vol. 81,p.142.)

A high-speed, portable, yoke-type hydraulic press for the application of timing gears and harmonic balancer units on automobile engine crankshafts is fitted with a locating fixture which assures starting the parts squarely on the shaft. Hydraulic pressure is provided by a "Hy-Power" hydraulic pressure generator. Operating cycle is completed automatically upon pressing the control button, which actuates the automatic electric valve unit.

Hammer, Pneumatic

Chambersburg Engineering Co., Chambersburg, Pa. (Vol.81,p. 25.)

Operated from normal shop supply of compressed air, with pressures of 75 to 100 lb. per sq.in., this pneumatic hammer has a lightweight ram which may be adjusted or modified to accommodate any particular

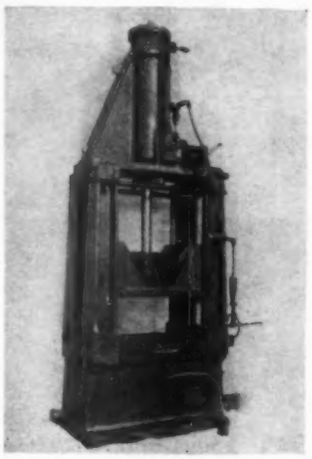


shape. Machine may be operated by hand lever or by means of a special treadle.

Hammer, Metal Forming, "Cecostamp"

Chambersburg Engineering Co., Chambersburg, Pa. (Vol.81,p. 1164.)

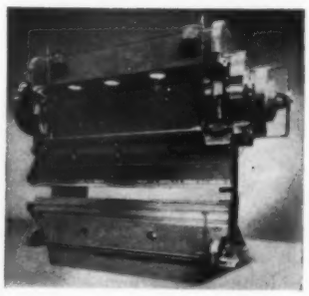
Designed to replace the "rope drop" hammer for drop stamping sheet metal parts, such as are required in the construction of modern streamlined trains and airplanes, the "Cecostamp" pneumatic hammer is said to produce formed sheet metal parts efficiently and economically. These hammers are made in a wide range of sizes to accommodate all sizes of stampings. "Cecostamp" can be controlled as easily as the operator would use a hand hammer.



Brake, Press, "Verson"

Verson Allsteel Press Co., 12015 Peoria St., Chicago, Ill. (Vol.81,p.346.)

There are five series of press brakes, comprising 20 different standard sizes in the "Verson"

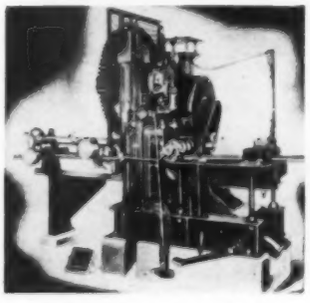


line. Where necessary standard dimensions may be varied to suit individual requirements.

Shear, Bar-Stock, Automatic

Buffalo Forge Co., 448 Broadway, Buffalo, N. Y. (Vol.81,p. 1168.)

Designed for high-speed, accurate shearing of bar stock for bolts and rivets, this automatic shear is equipped with power feed rolls that are made to grip and pull the stock into the shear only when the knives



are open on the "up" stroke. Three bars are fed and sheared at one time, at a rate of 30 strokes per min. An open-side tilting type gage provided at the rear is easily adjusted.

Brake, Bending

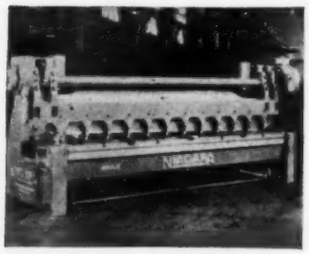
Whitney Metal Tool Co., Rockford, Ill. (Vol.81,p.388.)

An 18-gage combination bending brake has been added to the line of Whitney-Jensen brakes. These brakes are available in 5, 6, 8 and 10 ft. sizes.

Shears, Squaring

Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y. (Vol.81,p.1175.)

Series SL power squaring shears are built in 6, 8, 10 and 12 ft. lengths for flat shearing $\frac{5}{16}$ in. steel. They are also available in 14 and 16 ft.

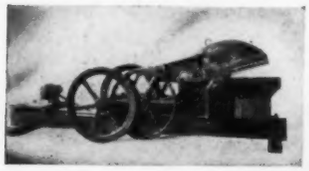


lengths with a capacity for No. 10 gage steel. Design includes a fourteen-point-engagement, sleeve-type clutch.

Shears, Alligator, "Canton"

Canton Foundry & Machine Co., 6400 Breakwater Ave., Cleveland, Ohio. (Vol.81,p.226.)

All-steel "Canton" alligator shears are now reinforced at points subject to strain and are heavier than previous models. Kingpin bushing can be replaced without removing

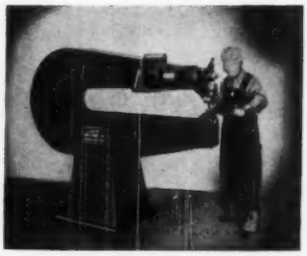


the kingpin or dismantling any part of the shear.

Shear, High-Speed

Libert Machine Co., Green Bay, Wis. (Vol.81,p.224.)

Model 1060 high-speed shear for irregular shapes is designed

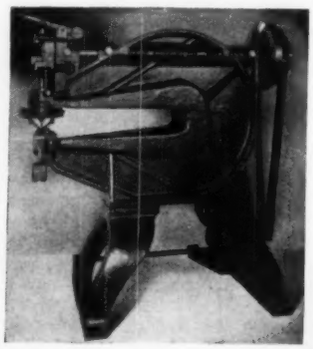


to cut 12-gage stainless steel or alloys of similar types. It has a throat depth of 60 in.

Nibbling Machine

Gray Machine Co., Box 596, Philadelphia, Pa. (Vol.81,p.143.)

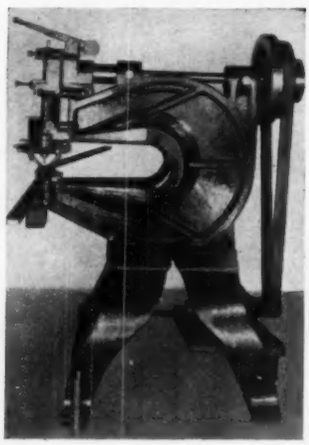
The No. 4 turret-head metal cutter has a 36-in. throat and $\frac{3}{8}$ in. capacity in mild steel. Capacity in hard, tough alloys is $\frac{5}{16}$-in. sheet. Two operating speeds are provided.



Nibbler, Turret-Head

Gray Machine Co., Box 596, Philadelphia, Pa. (Vol.1,p.873.)

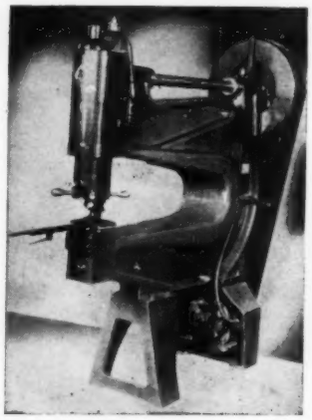
Model No. 4-A turret head metal cutter or nibbler has a $\frac{3}{8}$-in. capacity with a 24-in. throat. It is provided with an interchangeable eccentric to accommodate a shearing attachment to shear stock up to and including $\frac{1}{8}$ in. in thickness.



Nibbling Machines

W. J. Savage Co., Knoxville, Tenn. (Vol.81,p.584.)

Improvements in this line of nibbling machines include direct over-center drive, totally inclosed head, one-piece revolving head, and increased strength in the main frame. These nibbling machines are rated to cut from $\frac{1}{8}$- to $\frac{1}{4}$-in. thick sheet metal and have a range of throat depth from 8 to 36 in.



Bending Machine

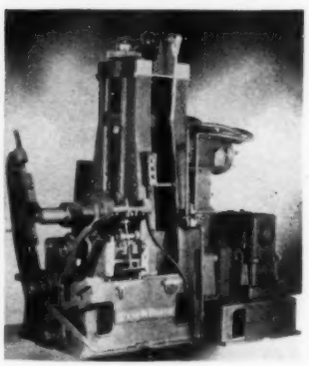
Wallace Supplies Mfg. Co., 1312 Diversey Parkway, Chicago, Ill. (Vol.81,p.305.)

No. 48 bar bending machine has capacity to bend cold a $1\frac{1}{4}$ in. square bar. It is operated by a geared head driven by a 5-hp. motor. Limit switches are fitted with adjustable trips.

Rolls, Bending, Wrapping-Type

Kane & Roach, Inc., Syracuse, N. Y. (Vol.81,p.713.)

Model 17-AH wrapping-type bending roll is designed for bending motor frames having a

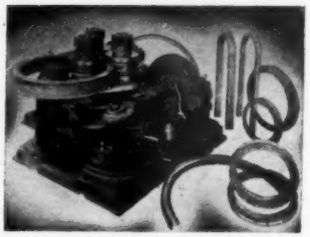


range of sections from $\frac{1}{4}$-in. square rolled to 8 in. inside diameter, to $\frac{7}{16}$-in. thick by $10\frac{1}{8}$ in. face rolled to $11\frac{5}{32}$-in. outside diameter. Machine is provided with a separate top or master roll for each diameter.

Rolls, Angle-Bending, Horizontal

Kane & Roach, Inc., Syracuse, N. Y. (Vol.81,p.627.)

In addition to being suitable for bending angles, the No. 23 horizontal angle-bending roll will bend I-beams, rails, chan-

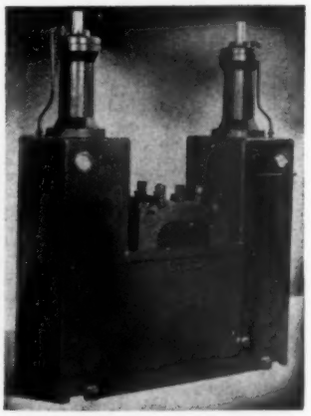


nels, flats, squares, T's, Z-bars, pipe and special shapes. Capacity is 5x5x$\frac{1}{2}$ in. angles, leg out, and $4\frac{1}{2}$x$4\frac{1}{2}$x$\frac{1}{2}$ in. angles, leg in.

Twisting Machine, Propeller

Oilgear Co., Milwaukee, Wis. (Vol.81,p.26.)

Airplane propeller blades, ranging in size from 5 in. wide



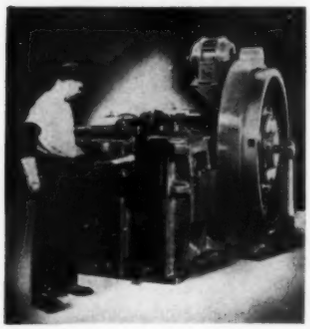
by 1 in. thick to 14 in. wide by 4 in. thick, are twisted to the pitch required at various sections by this hydraulic machine. In the center of the machine frame is a floating twister arm supported in the normal starting position by two cage springs, one on each end. Two vertical, non-differential, hydraulically-operated cylinders apply an equal force to each end of the arm.

Forging Machines, Bolt-Heading

Ajax Mfg. Co., Cleveland, Ohio. (Vol.81,p.141.)

Bolt heading and upsetting forging machines are available in two sizes, rated at 1 in. and $1\frac{1}{2}$ in. capacity. These models

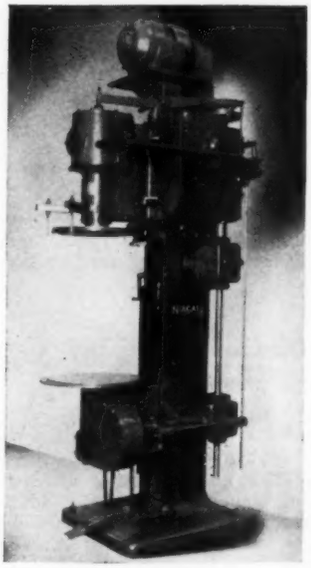
embody a completely new design and are equipped with the Ajax air clutch.



Seamers, Double

Niagara Machine & Tool Wks., 637-697 Northland Ave., Buffalo, N. Y. (Vol.81,p.264.)

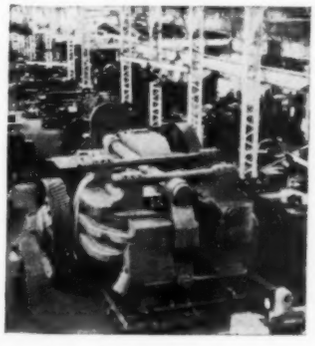
Two vertical, single-end, double seamers, are available for semi-automatic double seaming of heads in metal containers and feature variable cams for changing the ratio of feed at which the rolls operate. Model No. 304 has a capacity for 24 gage material; No. 305, illustrated, handles 22 gage stock.



Forging Machines, "High-Duty"

National Machinery Co., Tiffin, Ohio. (Vol.81,p.810.)

"High-Duty" forging machines intended for upsetting



operations on tubing will handle sizes as large as 13 to 14 in. diameter. Design is similar to standard forging machines.

Heaters, Induction, For Forging

Ajax Electrothermic Corp., Trenton, N. J. (Vol.81,p.467.)

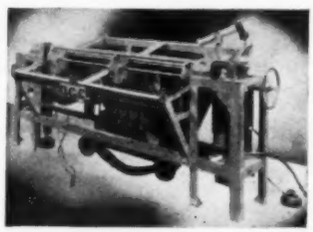
Recent applications of induction heating equipment include equipment for heating the ends of tubes prior to a series of forging operations and for heating an end section of a large steel tube prior to swaging. End sections of two 6-in. steel

pipes are heated to 2,200 F. in less than one minute, after which they are forged. A special focus inductor coil on another unit is used to heat a narrow band at the end of these tubes following the forging operation and prior to a swaging operation.

Heater, Bar, Electric, "Berwick"

American Car & Foundry Co., 30 Church St., New York, N. Y. (Vol.81,p.672.)

The A.C.F. "Berwick" air-operated, 6-ft. bar heater has capacity for bars ranging from $\frac{3}{8}$- to 1-in. in diameter. One electrode is counterweighted to take care of expansion of the bar being heated. Bars $\frac{1}{2}$ in. in diameter can be heated to 2,000



F. in 30 sec.; a 1-in. diameter bar can be heated to 2,000 F. in 75 sec.

Die-Casting Machine, Zinc, No. 1½

Reed-Prentice Corp., Worcester, Mass. (Vol.81,p.260.)

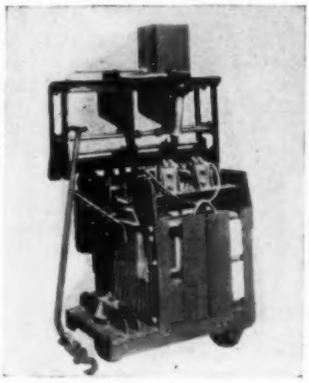
The No. 1½ zinc die-casting machine is fully hydraulic. Two levers control the operation and these are interlocked. A safety pilot valve mechanism eliminates danger of shooting metal when dies are open.

Die plates are approximately 28x29 in., and space between bars is 18x18 in.; die opens 10 in.; maximum die space is 18 in.; minimum die space is 6 in.

Heater, Forging, Portable, Type LAA

American Car & Foundry Co., 30 Church St., New York, N. Y. (Vol.81,p.889.)

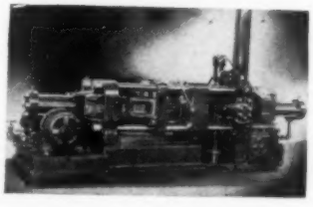
Equipped with two water-cooled electrodes, each having capacity for heating ¼-½ in. diameter slugs, the No. 3-1 Type LAA portable forging heater has replaceable heating blocks. Heating is by contact resistance and the only loss is by radiation. No current is consumed until the piece is gripped by the electrodes.



Die-Casting Machine, Brass, No. 8G

Reed-Prentice Corp., Worcester, Mass. (Vol.81,p.22.)

The No. 8G brass-alloy, die-casting machine is semi-automatic in operation. In use, the operator closes the dies and cores by means of a lever and then ladles the material into the metal cylinder. He then steps on a pedal, which operates the plunger and forces the metal into the dies. When the metal has solidified and the

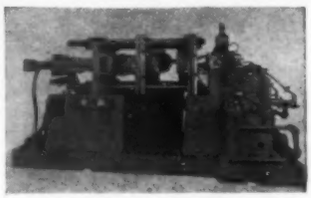


cores have been withdrawn, the machine automatically opens and forces the slug out of the die.

Die-Casting Machine, Hydraulic, Model BH

Kux-Lohner Machine Co., 2145-47 Lexington St., Chicago, Ill. (Vol.81,p.1236.)

Arranged as completely self-contained units that require no



air compressor, except when used for aluminum castings, the Model BH hydraulic die-casting machines are suitable for casting lead, zinc, or aluminum base alloys.

Molding Machine, Plastic, No. 10

Reed-Prentice Corp., Worcester, Mass. (Vol.81,p.304.)

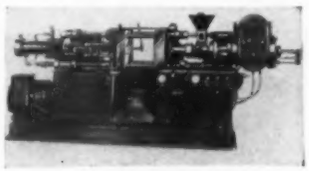
Model No. 10 automatic hydraulic plastic injection molding machine has been improved by several major changes in design. The automatic timing

control is now adjustable from 1 to 120 seconds. Entire toggle end of the machine is adjustable through screws.

Molding Machine, Plastic, No. 10-A

Reed-Prentice Corp., Worcester, Mass. (Vol.81,p.996.)

Model 10-A plastic injection molding machine incorporates a number of improvements over the No. 10 machine. Stationary side plate has been increased to 4¾ in. thickness and movable steel die plate is 4½ in. thick.

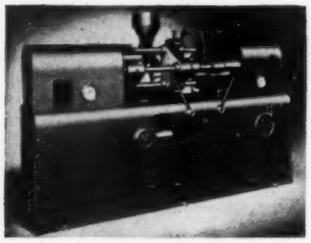


Pressure on material is variable from 2,000 to 21,000 lb. per sq. in.

Molding Machine, Plastic, Extrusion

Hydraulic Press Mfg. Co., Mt. Gilead, Ohio. (Vol.81,p.25.)

This hydro-power plastic extrusion molding press is a self-contained unit which works hydraulically, with all func-

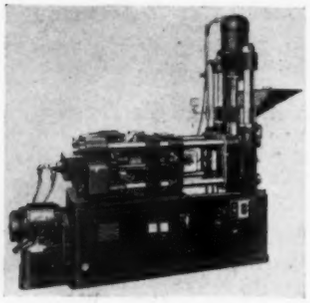


tions synchronized for accurate operation. Granular material is fed from a hopper which is directly connected with the heating chamber. A reciprocating plunger forces the material through the heating chamber where it is brought to the required plasticity. The plastic is then subjected to a high pressure for extrusion into the mold.

Molding Machine, Plastic

Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio. (Vol.81,p.812.)

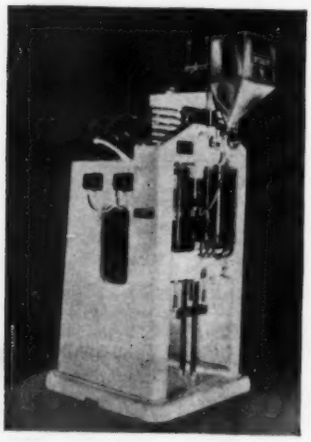
The Lester designed Model LPM-2 injection molding machine for thermoplastic materials is suitable for the injection of a maximum weight of 6 oz. per casting. Machine can be operated automatically or semi-automatically. Injection stroke of 8½ in. is accomplished in 3 sec.



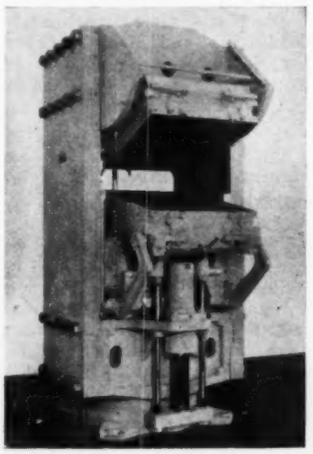
Molding Machine, Plastic, Vertical

F. J. Stokes Machine Co., 5939 Tabor Rd., Olney P.O., Philadelphia, Pa. (Vol.81,p.1007.)

This completely automatic molding machine is designed to



mold thermosetting plastic materials of the phenolic base and urea compound types. With the hopper filled, the metering device adjusted to feed the proper amount of molding powder and the machine set for correct breathing and curing time and mold temperature, the production cycle will be repeated, automatically.



Press, Molding, Hydraulic

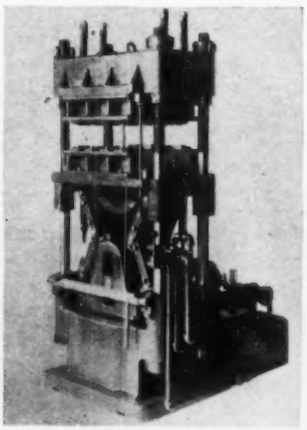
Lake Erie Engineering Corp., 268 Perry St., Buffalo, N. Y. (Vol.81,p.1282.)

Of 1,000-ton capacity, this automatic tilting-platen hydraulic molding press is suitable for molds measuring 38x38 in. Automatic multiple ejection is provided. Presses are suitable for use with self-contained pumps or for accumulator operation.

Press, Molding, Mechanical

The Standard Machinery Co., Mystic, Conn. (Vol.81,p.1225.)

These presses are made in 50, 100, 150 and 300 ton models, and are operated under 1,000 lb. per sq.in. pressure. Hy-



draulic cylinder and ram, which operate the triple toggle, are located in the center of the press and operation is controlled by a single lever on the four-way valve.

Spring Coilers, Universal, Series 610

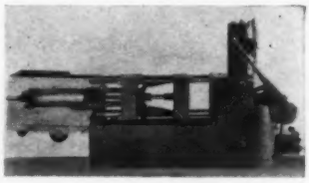
Sleeper & Hartley, Inc. 335 Chandler St., Worcester, Mass. (Vol.81,p.894.)

Developed to provide a universal coiler with the accuracy of the segment-type coilers, the range of wire feed of the clutch-type coiler and the ability to be used as a continuous coiling machine, the No. 1, Series 610 selective-type universal spring coiler will wind up to 95 springs per min. from 0.018 to 0.062 in. diameter wire.

Die-Casting Machines, High-Pressure

H. L. Harvill, Inc., 2344 E. 38th St., Los Angeles, Calif. (Vol.81,p.1170.)

Available in three sizes, these full-pneumatic die-casting machines are of the high-pressure



injector type in which air does not come in contact with the molten metal.

Spring Coilers, Coil and Torsion

Torrington Mfg. Co., Torrington, Conn. (Vol.81,p.754.)

Segment and clutch-type coil-

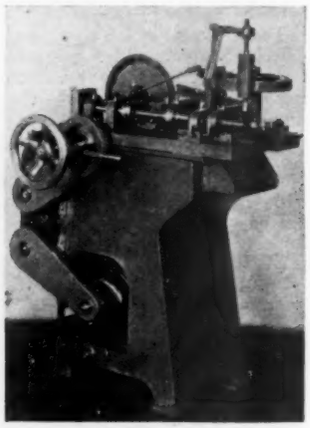
ers are available in eight sizes, covering a range from 0.006 to ⅜-in. diameter wire. Cutter shafts are adjusted axially at the front of the machine. Controls are manipulated by screws at top.

Torsion-type spring winding machines are available in four sizes, covering a range from 0.006 to ¼-in. diameter wire.

Spring Coilers, Torsion

Sleeper & Hartley, Inc., 335 Chandler St., Worcester, Mass. (Vol.81,p.1161.)

Standard equipment of these improved torsion-spring winding machines includes a double-acting cutting-off slide which will cut off both right- or left-hand springs and can be used

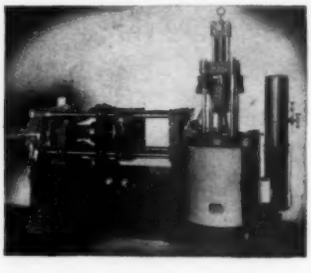


to provide bends on the long end of springs. These machines will accommodate a four-slide attachment for cutting and forming ends.

Die-Casting Machine, Lester No. HHP-2

Phoenix Ice Machine Co., 2703 Church Ave., Cleveland, Ohio (Vol.81,p.222.)

The Lester HHP-2 die-casting machine, for zinc and white metal, is operated by a self-contained hydraulic unit. Die movement is a combination of a hydraulic cylinder and linkages. Die space can be adjusted to fit the die without misalignment of die plates. Specifications: clearance between bars, 12x14 in.; maximum die height, without automatic ejector box, 14¼ in.; with automatic ejector box, 6¼ in.; die opens, 7½ in.; locking pressure on die, 70 tons; machine weight, approximately 6,400 lb.



You Can Do All This and MORE

with a "Buffalo" Bending Roll

Tee bar bent over flange.

Channel bent on web, flanges out.

Channel bent on web, flanges in.

Above, flat bent on flat, to be used as rim for welded steel gear.

Angle iron bent in spiral-leg-in.

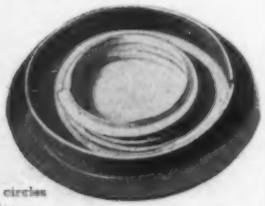
Angle iron bent in spiral-leg-out.

Angle bent in arc.

Angle bent in arc.

Copper coil spirals for installing in a juice heater. Note uniform diameters obtained without filling the tubing.

Section of conveyor consisting of angles leg in and out, flats on flat, and flats on edge, all rolled on No. 1 Buffalo Vertical Bending Roll.



Angles bent in circles and spirals.

● These rugged, precision-built "Buffalo" Bending Rolls will do your toughest bending jobs as easily as "rolling off a log." Rolls can be changed to handle almost any shape—flat steel, angles, tees, tubing, etc.

Manufacturers who have installed "Buffalo" Bending Rolls have shown us reduced production costs on their bending jobs that are little short of amazing.

We are prepared to supply you with the size and type to solve your own bending problems most economically.

Write for Bulletin 351.

BUFFALO FORGE COMPANY

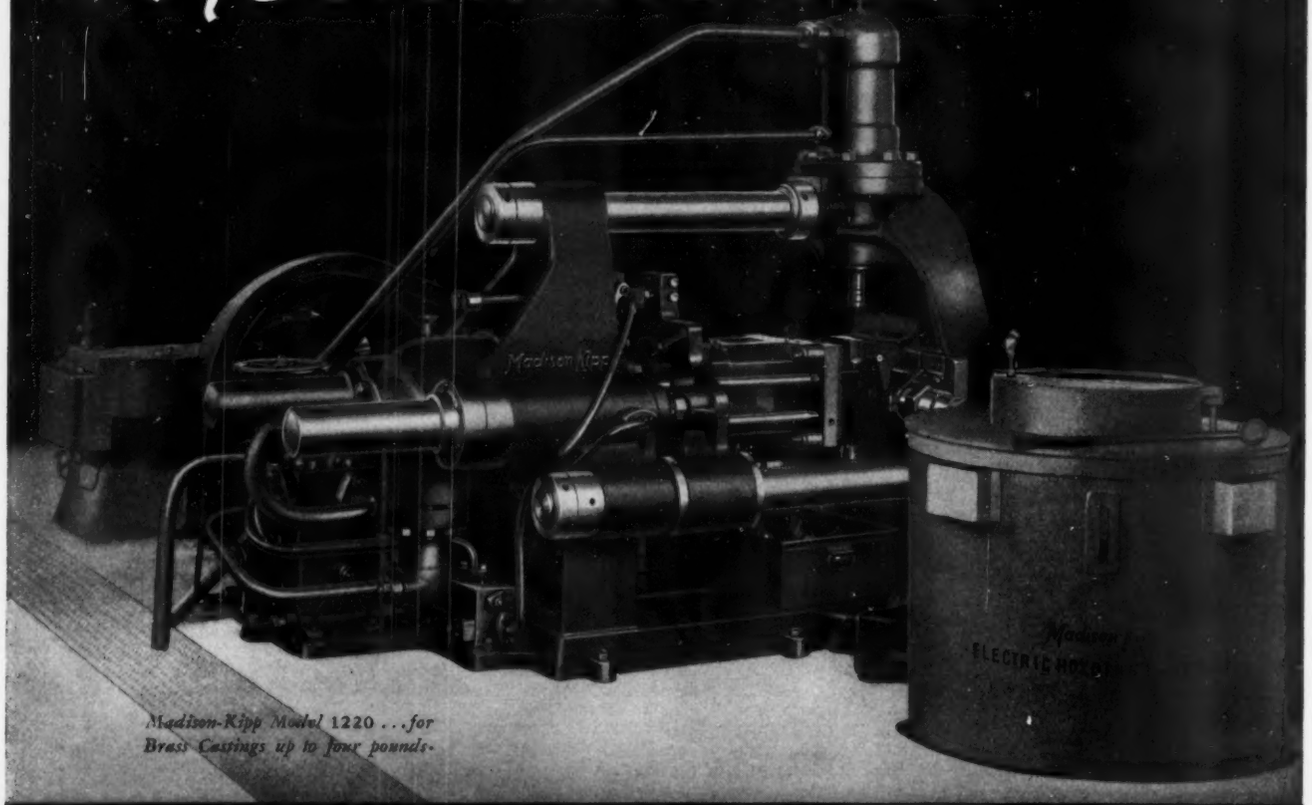
448 Broadway **Buffalo, N. Y.**

Branch Engineering Offices in Principal Cities

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

via MADISON-KIPP

... BRASS FOUNDING GOES *Mechanical*

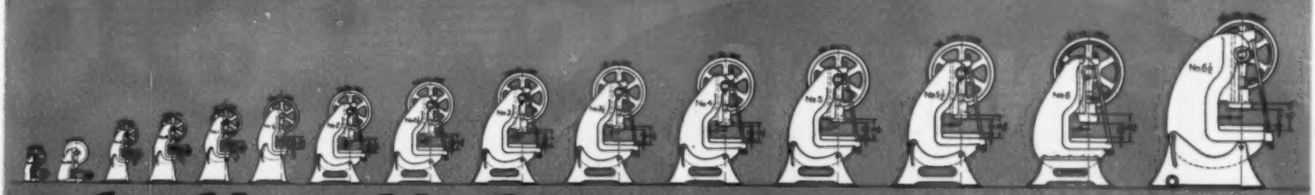


Madison-Kipp Model 1220 . . . *for Brass Castings up to four pounds.*

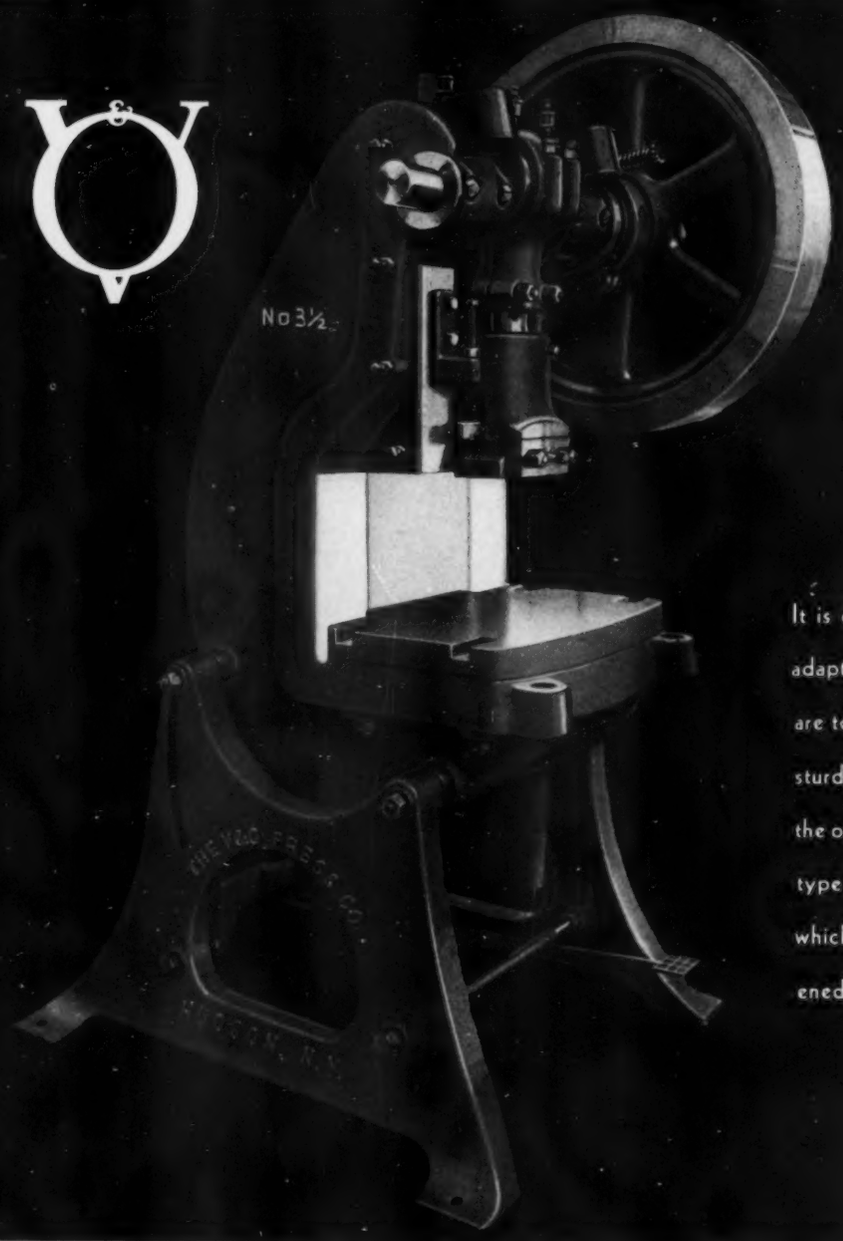
BRASS DIE CASTING IS FOR THE MECHANICAL INDUSTRIES

It's logical for the mechanical industries to promote brass die casting just as they did zinc die casting because it is a job for mechanics, not moulders. Look at the five fold increase in zinc alloy tonnage since 1927 when Madison-Kipp first announced automatic die casting machines and the open door policy. Isn't there an equal opportunity in brass for parts used in services where other non-ferrous metals are less suited? Madison-Kipp brass machines are perfected for the tool-room-equipped shop or foundry. Madison-Kipp brass die casting department is prepared to cast parts for those who prefer to buy castings as a preliminary to making their own. You are invited to come to Madison to see for yourself or to send samples and blue prints for a complete analysis.

MADISON-KIPP CORPORATION
201 WAUBESA ST. MADISON, WISCONSIN U.S.A.



An Adaptable Line with the DAYLIGHT THROAT



It is difficult to over-emphasize how adaptable V & O Inclinable Presses are to a wide range of operations. The sturdiness of the body, the long slide, the overhanging bearings, the eccentric type shaft, all go to make up rigidity, which in turn is reflected in the lengthened life of the dies.

THE V & O PRESS COMPANY, HUDSON, NEW YORK, U.S.A.

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ELLIOTT & STEPHENS MACHINERY CO., ST. LOUIS.
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PUNCHING *becomes a* PRODUCTION JOB

An entirely NEW method of performing punching operations . . .

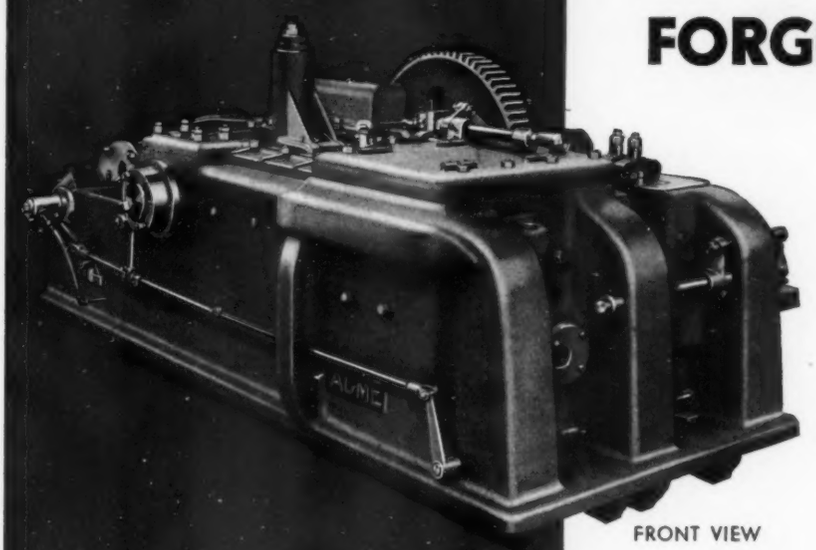
In this, the latest addition to the extensive Wiedemann line, we bring to industry not only the largest Turret Punch ever built, but also a revolutionary technique of punching operations. No layouts are necessary, all work is completed on machine with single handling, and more finished pieces are produced at lower per piece costs. Type R-7 Turret Punch has a 54″ depth of throat with 24 to 32 stations on 40″ centers depending on the shapes and sizes desired. At a pressure of 160,000 lb. it will punch a 6″ round or square hole in ¼″ mild steel. Will handle sheets up to 50″x 100″ without reversing sheet.

Wiedemann builds a complete line of Turret Punches to meet practically every production need. All are quickly adjustable to punching hard or soft metals. All are rapid and economical in operation. Available in Throat depths of 18″, 24″ and 28″—pressures from 15,000 lb. to 160,000 lb. and with 12 to 32 stations.

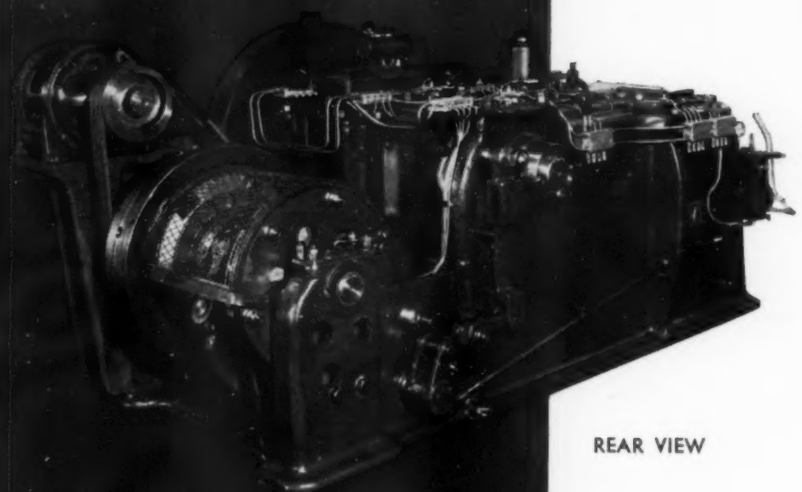
WIEDEMANN MACHINE COMPANY
1801-1831 Sedgley Ave. Philadelphia, Pa.

MODEL 35 ACME

UPSETTING AND FORGING MACHINES



FRONT VIEW



REAR VIEW

• The Acme Line of modern heavy duty forging machines offers many novel and original features in design and construction, resulting in smoother operation, freedom from excessive flash, and better forgings. The cushioned drive and new eccentric main shaft with sliding head movement introduce a distinctly new and novel forging machine construction which surpasses all other types. The Acme Cushioned Drive presents many distinct advantages, among which are:

Greater Production With Instantaneous Starting

Easy, Silent Operation

Shock-Proof Starting and Stopping

Overload Safety Factor

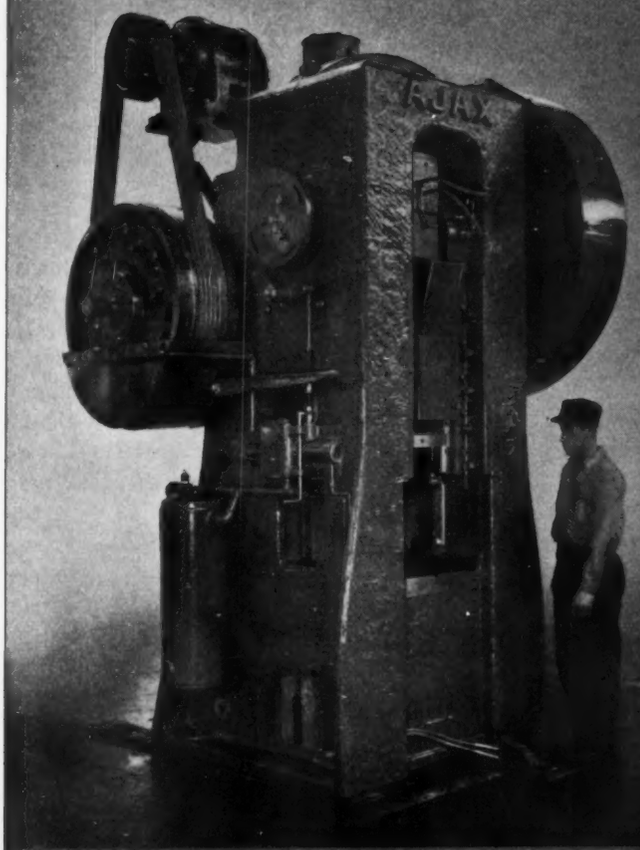
Lower Maintenance

There are seven sizes of Acme Forging Machines available, ranging in capacity from 1 inch to 5 inches. Send for bulletin describing their design and operation in detail.

(Refer to our Threading Machine advertisement on page 109)

THE ACME MACHINERY CO.
CLEVELAND, OHIO, U.S.A.

AJAX



Capacities 500 to 2000 Tons

FOR MOST ACCURATE HIGH SPEED FORGING

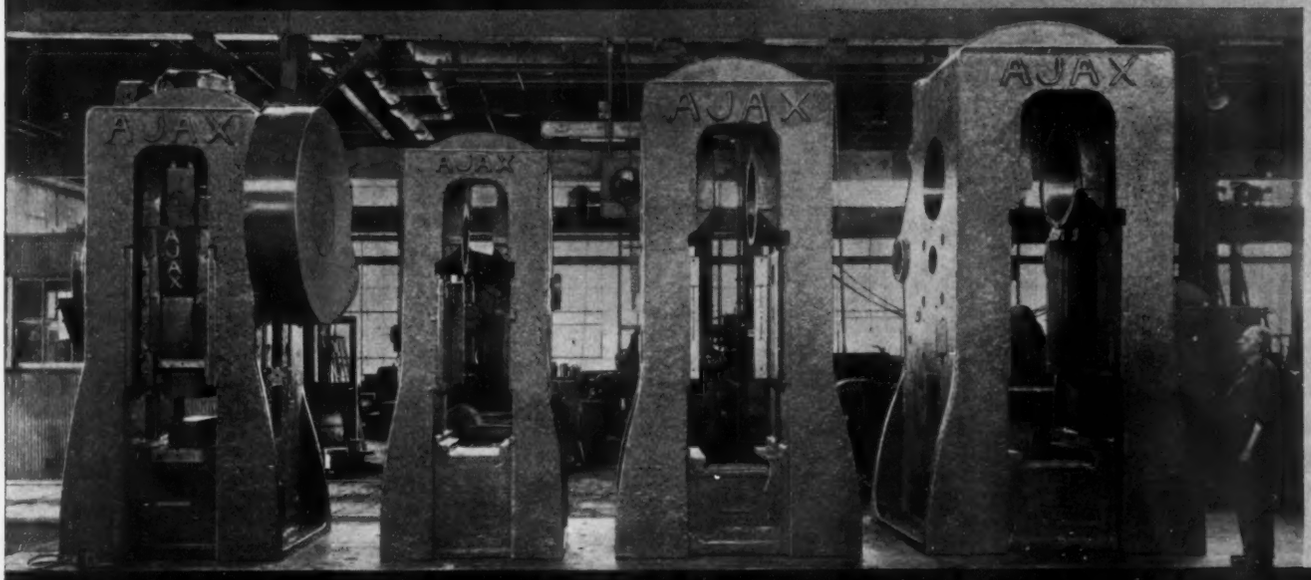
These new Ajax Forging Presses are definitely established as most valuable production machines in modern production forge shops. They are making certain classes of forgings with a degree of accuracy and economy far surpassing other types of forging equipment.

The rear-extension guided slide with tongued-in coverplates, and adjustments for perfect alignment, gives accurate die match, while their massive, unyielding, solid steel frame, and flexure-proof eccentric shaft hold forgings to uniform thickness.

The patented, direct-acting air clutch with smooth, cushioned starting at speeds far exceeding past limits, responds instantly when tripped by the operator, resulting in high outputs.

Individually driven by motor of small horsepower compared to tonnage developed; negligible maintenance expense because of rugged, durable construction; eminently satisfactory die life due to brief contact period with hot metal; and proportionately low, direct labor costs, give economies from which you could benefit.

Consult us for particulars on your forged products.



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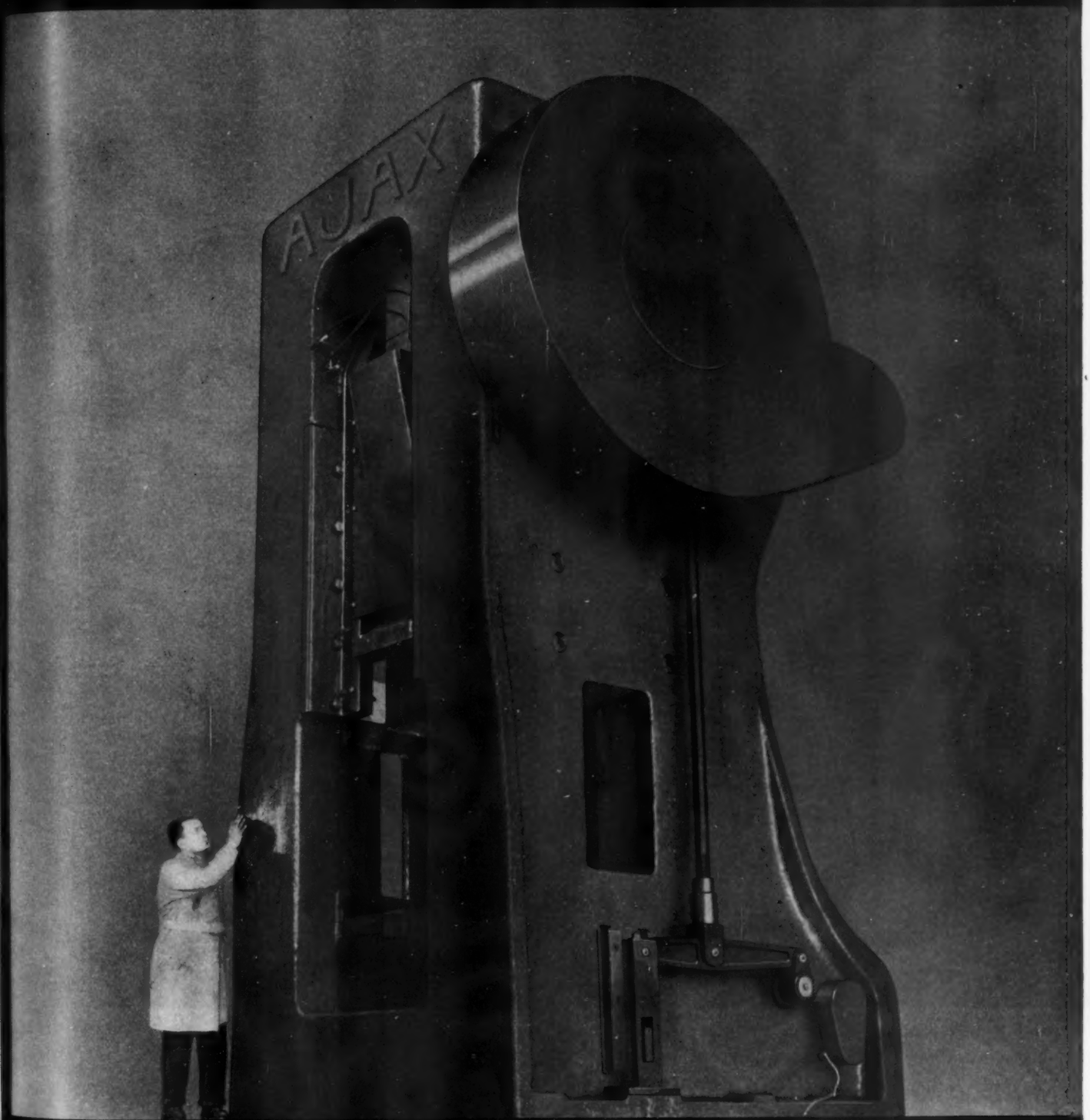

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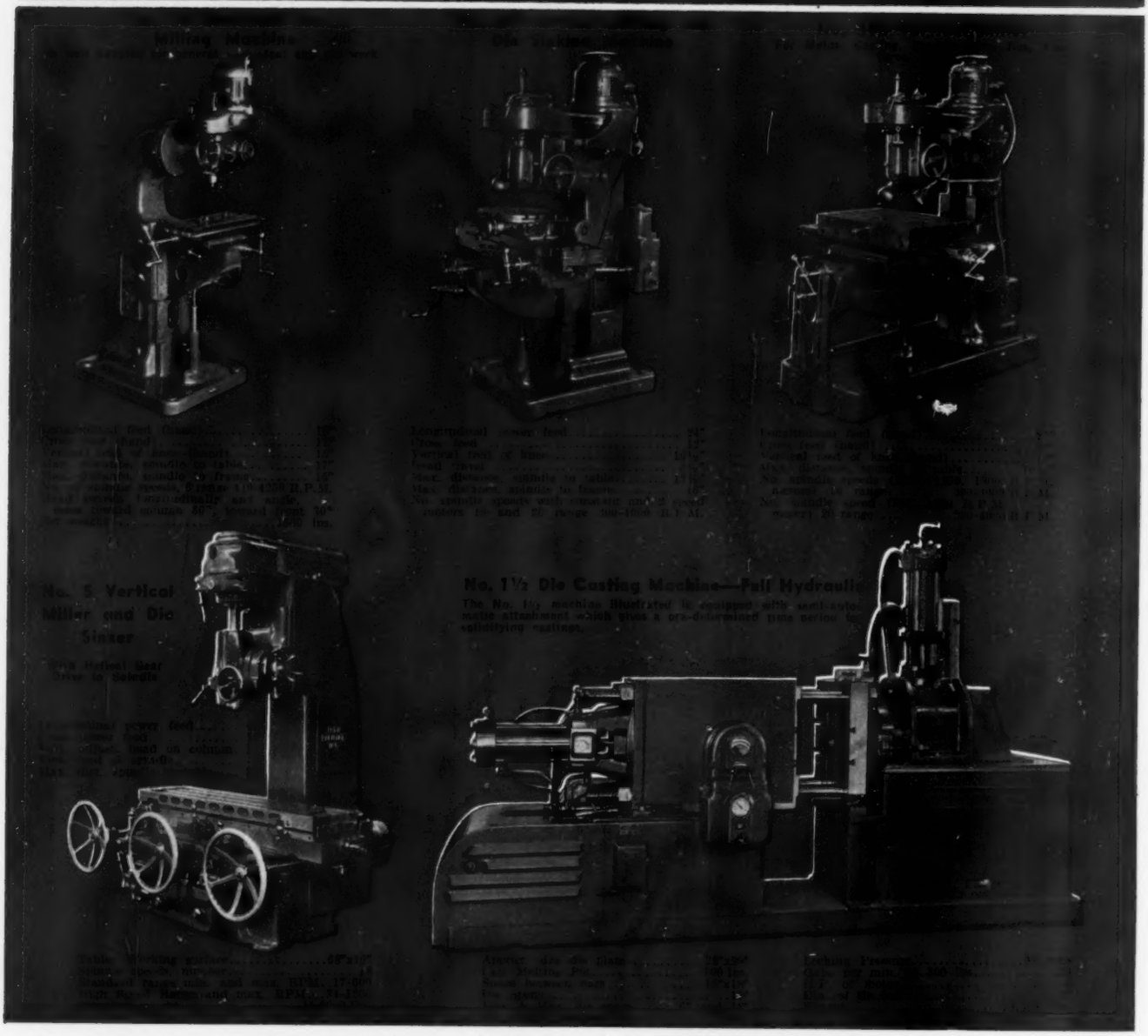

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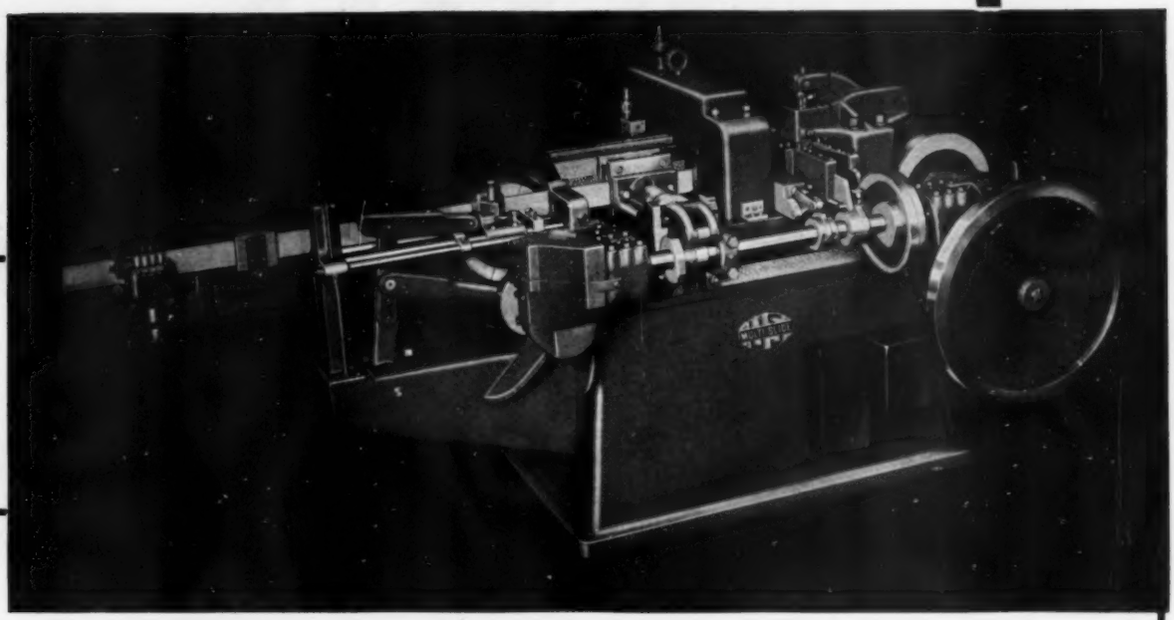

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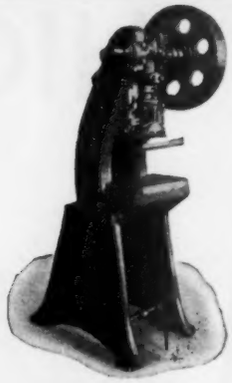

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Reclinable Power Press

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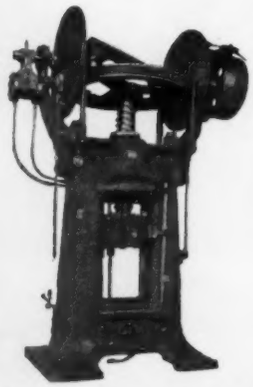
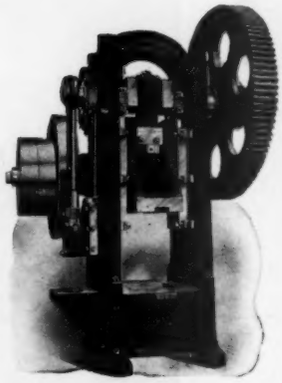


Patent Percussion Power Press



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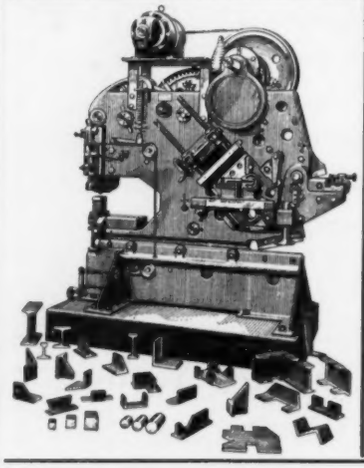

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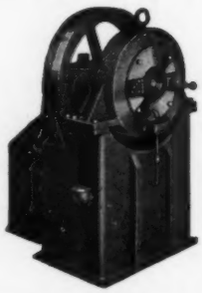

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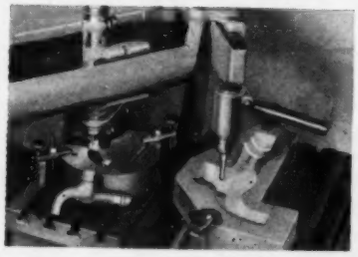

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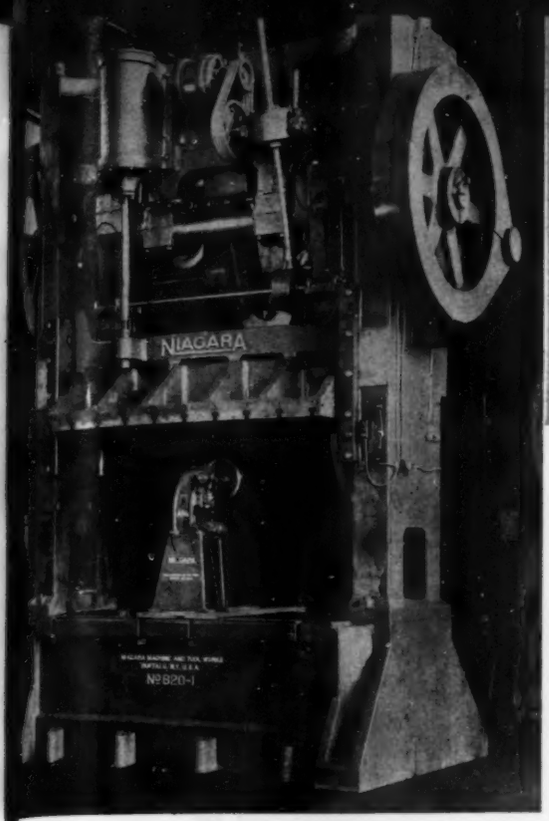
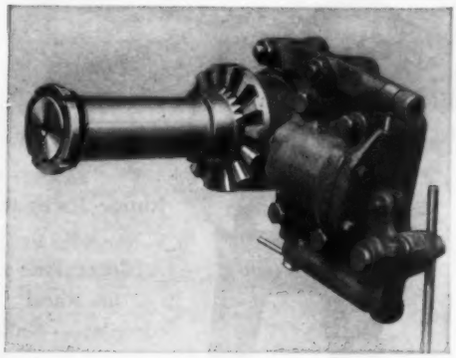
PRESSES AND SHEARS
ARE MONEY MAKING MACHINES



Showing a large Double Crank Press with air operated friction clutch and a small inclinable press with sleeve clutch, illustrating how the complete Niagara line provides the correct size and type to fit the specified requirements.

The proof of a machine is in the using. New and exclusive developments, strength, rigidity, more strokes per hour, convenient, safe operation—those are a few results of Niagara engineering that hard boiled production men are welcoming with open arms. Write for Bulletins showing latest developments in Presses, Shears and Machines for shearing, blanking, drawing and forming plate and sheet metal.



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This patented Niagara 14 point engagement Sleeve Clutch provides instant engagement, more strokes per hour, long life and safety. An exclusive feature of Niagara Presses and Shears.

Production men in every branch of the pressed metal industry are approving the advanced engineering in Niagara Presses. It is responsible for increased production and lower costs.

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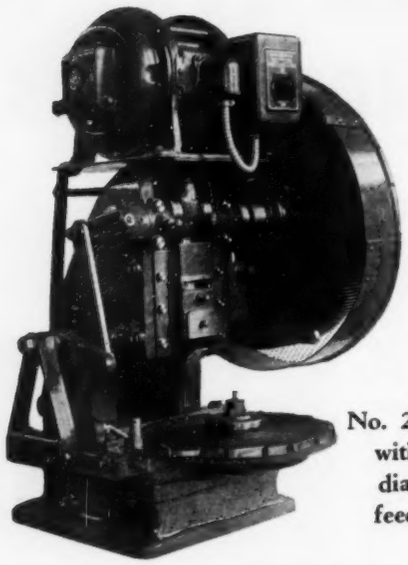


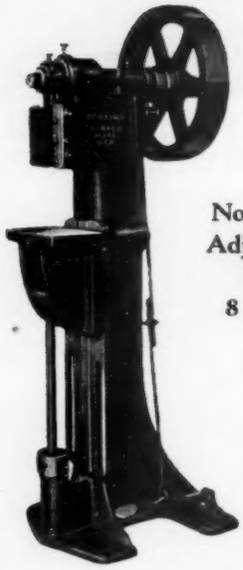
No. 2 A with dial feed.

Model A in sizes 1 to 12; 250 lbs. to 22,000 lbs.

PERKINS POWER PRESSES

Junior with roll feed.

A variety of strokes, die heights and throat depths available.



No. 42 E. Adjustable bed 8 sizes.

Also all sizes in
- Long Stroke presses
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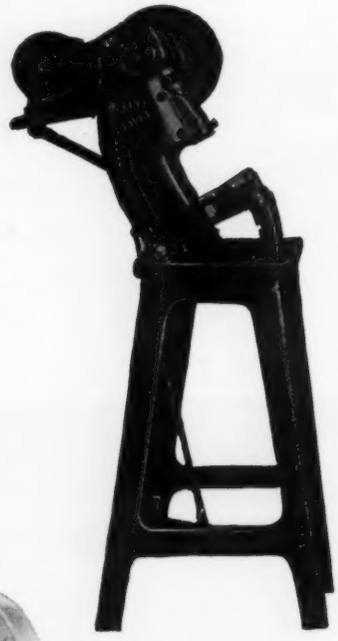
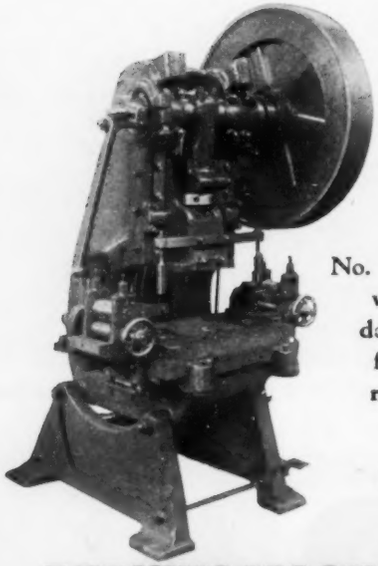


Junior Inclinable with Motor Drive on stand complete—$90.00

No. 800 B Geared Capacity 150 tons.



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Model B Inclinable presses. 300 lbs. to 15,000 lbs. Safety single trip clutch—ribbed frames—double telescopic piston adjustment.

50 years of press building

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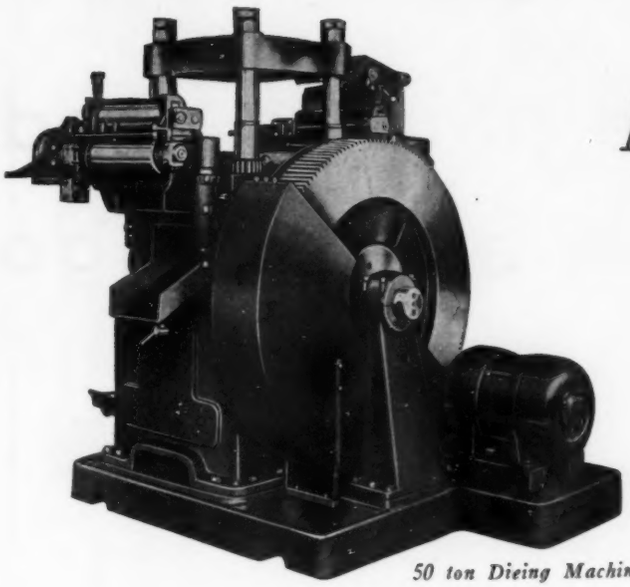
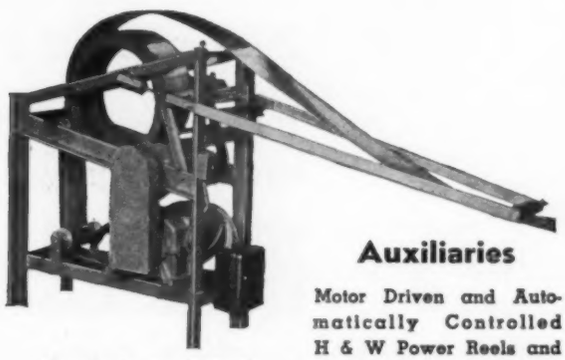


50 ton Dieing Machine

Dieing Machines

Producing completed stampings at each stroke with machine operating at high speed, the Dieing Machine provides maximum production economy. Scientific design and precision workmanship assure exceptional tool life.



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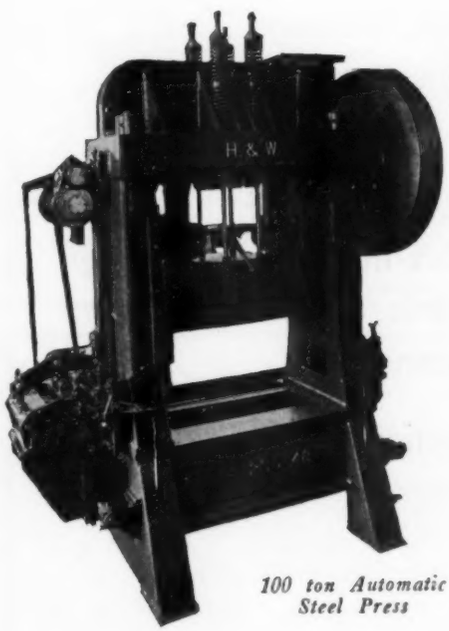
Motor Driven and Automatically Controlled H & W Power Reels and Straighteners increase press efficiency.

Automatic Steel Presses

Adaptable to a wide range of work, these presses are precision built for automatic stamping operations. Patented design of welded steel frame insures exceptional rigidity.



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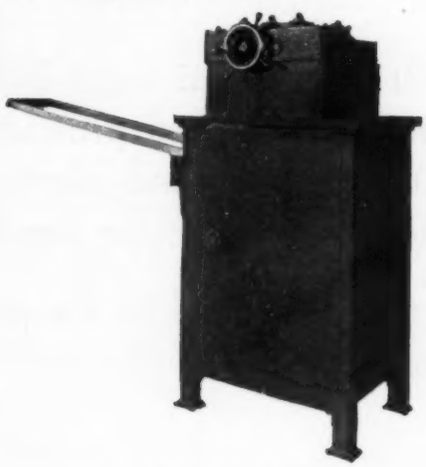
Sensitive Drilling Machines

Offered in a wide range of types and capacities to cover every production requirement.



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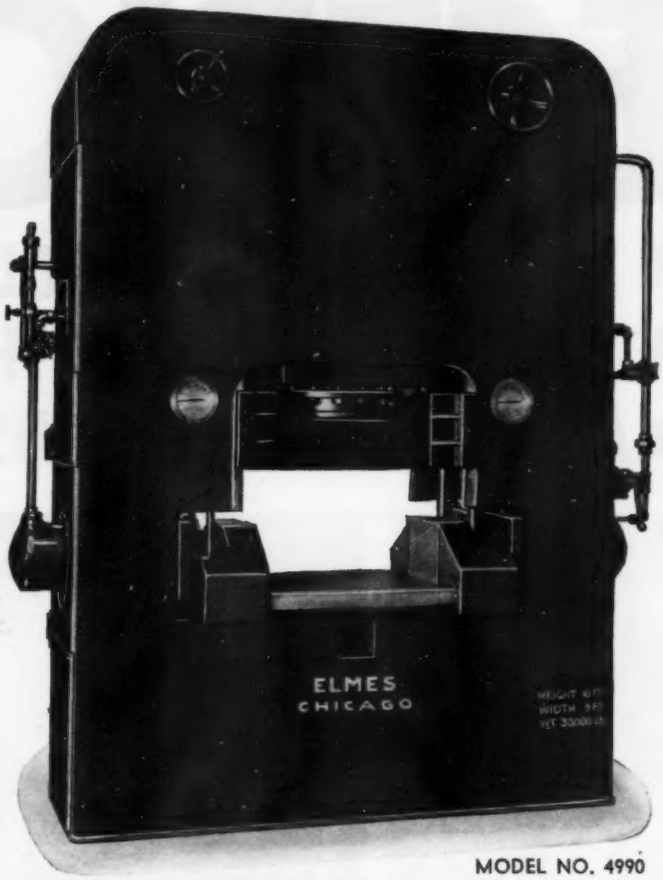

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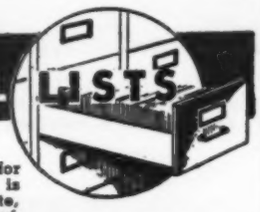

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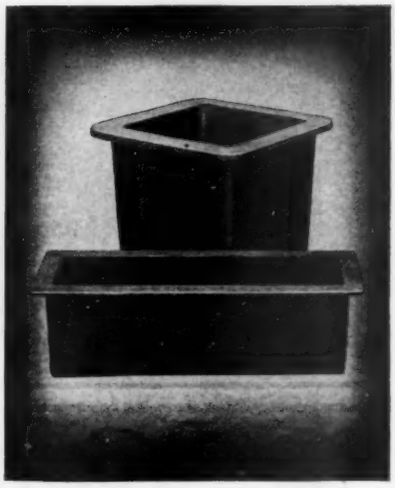
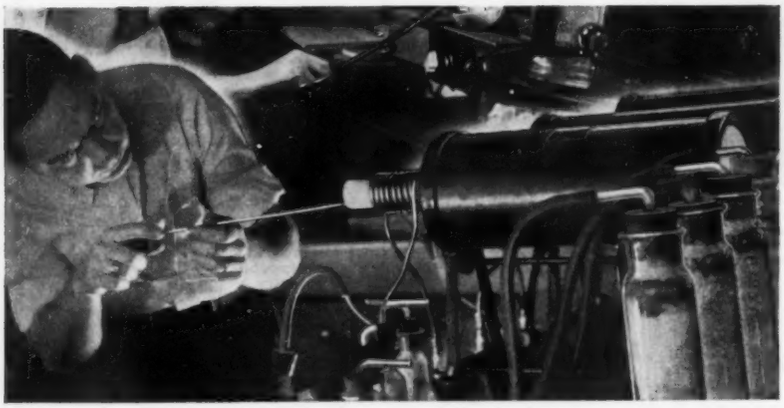
1 Tubing for the fuselage of the Boeing Airplane is heat-treated in this Hoskins Electric Furnace.

2 This Hoskins Electric Lead Pot does a good job, in a Plymouth tool room.

3 Used for light heat-treating, and chemical ignitions, is this small furnace, FH-204.



4 An "Alloy 502" Box; poured from uniform metal melted in high frequency induction furnaces.



5 In Ford's model laboratory at Dearborn, these FH-303 furnaces make countless carbon combustions. In their plant, are many Hoskins heat-treating furnaces.

● Electric heat does a good job for us in melting and annealing all our alloys; and through Hoskins Electric Furnaces, electric heat likewise does a good job for our hundreds of customers. . . We make several things that would be helpful to you. They are listed below. For useful information, write to us.

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Heat-Treating

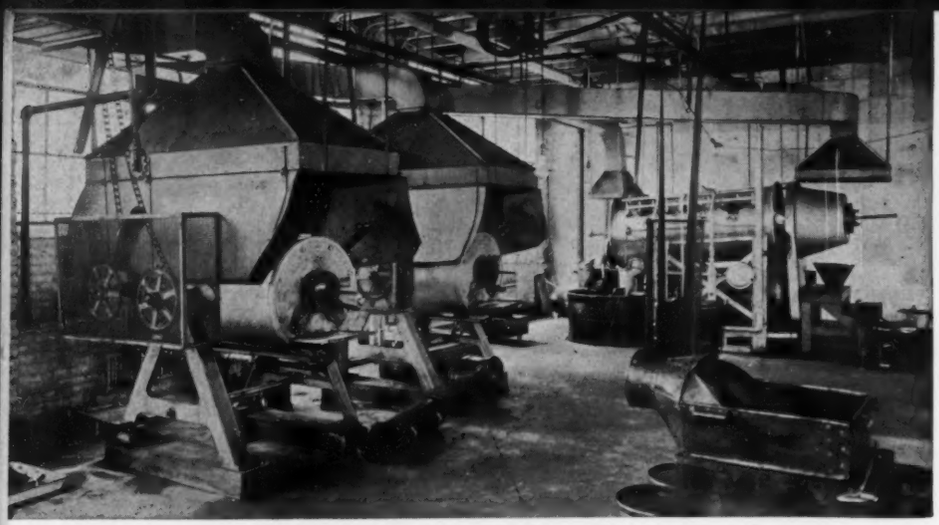
CONTROLLED, non-oxidizing atmospheres are being used to an increasing extent in practically all types of heat-treating furnaces. Some of the units introduced during the past year provide for pre-heating, heating and cooling stages all in a controlled atmosphere. An electrically-heated furnace, designed for heat-treating drill-chuck sleeves, permits scale-free hardening on a continuous basis. A plate-belt conveyor and a tray-loading device are included in the assembly of this unit.

A small, gas-fired furnace, formerly arranged with an open hearth, now has a full muffle. Work being treated passes through the furnace without coming in contact with products of combustion, or air, from the time it enters until it is quenched. Hearth of this unit reciprocates to carry the work through the furnace by its own inertia. Discharge of parts into the quench tank is said to be practically individual.

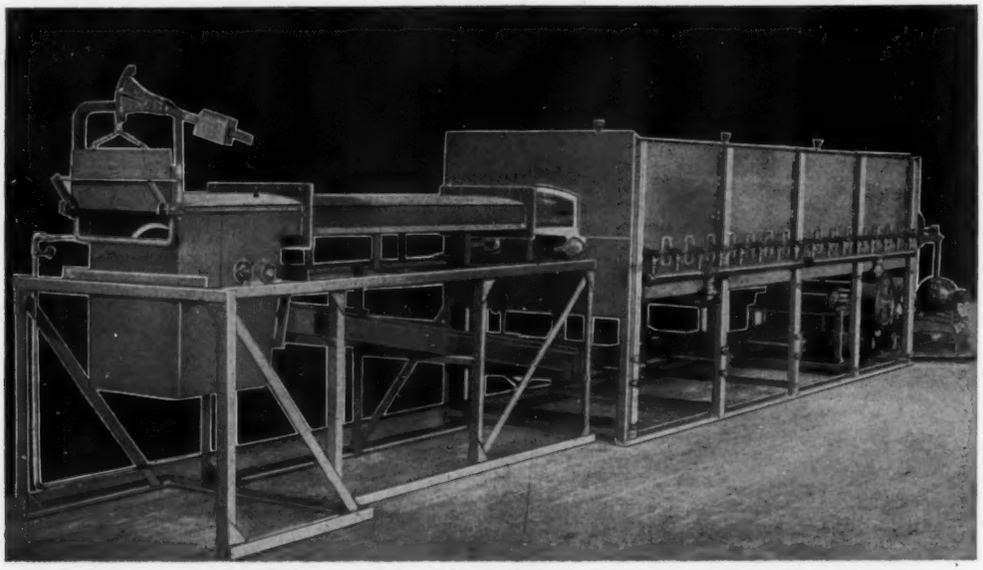
One attendant can charge and discharge the entire output of a water-sealed rotary-hearth furnace on which improvements were announced. Tangential-burner firing and a circular combustion chamber are claimed to permit close control of temperature and atmosphere throughout the heating chamber. While this type furnace was originally designed for heating steel bars for forging, it is finding increasing application in the heat-treating field. Some installations have been made in which such a furnace was placed directly in the production line, with a continuous flow of material to and from the heat-treating furnace.

Another interesting development has been the application of gas-fired radiant tubes to heat-treating furnaces. In one large installation such tubes were placed below the hearth level and in the furnace roof to insure heating the material uniformly, from above and below. This particular unit was designed for scale-free annealing of miscellaneous stampings, which are loaded into trays and pushed into the furnace through a lock chamber. The trays then pass through a recuperative chamber and into the heating chamber. At the far end of this chamber, the trays are conveyed across the end of the furnace to a return line, on which they are pushed back through the recuperative chamber, where incoming stampings are heated by heat from outgoing material.

Further improvements were announced in the flame-hardening process as applied to the treatment of gear teeth. A new unit has two sets of combined torches and quenching tips, on each of two heads, so that both sides of a tooth can be treated simultaneously and double helical or herringbone gears can be hardened on both helixes at the same time. While this unit was designed for herringbone gears, it is equally suitable for hardening the teeth of single helical and straight tooth gears as well as splines and rolling-mill wabblers. Gears up to 85 in. in diameter with a 24-in. face and having teeth of 6 to 1 D.P. can be handled with this unit.



Continuous clean hardening in Rotary Retort Machine with atmospheric control, also rotary tempering and gunmetal finishing.



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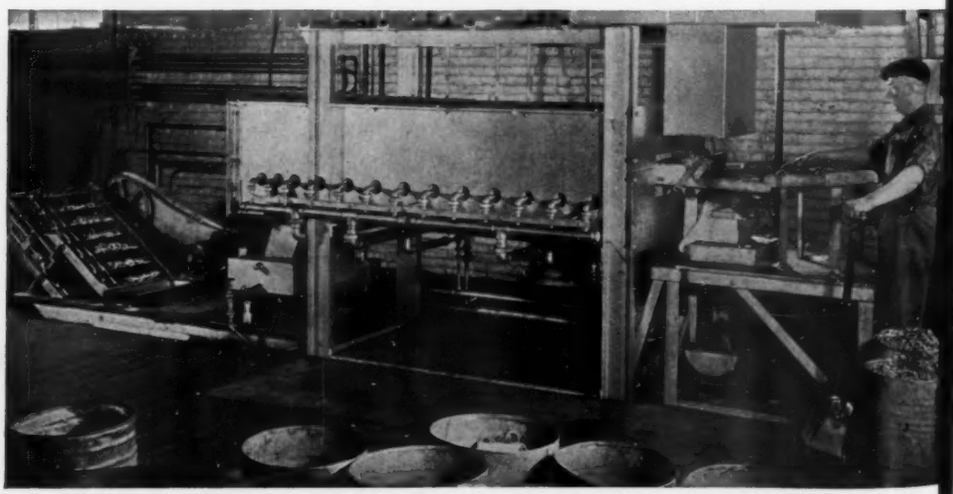


Continuous clean hardening in Reciprocating Full Muffle Heating Machine under atmospheric control.

American Gas Furnace Co.

Elizabeth, New Jersey

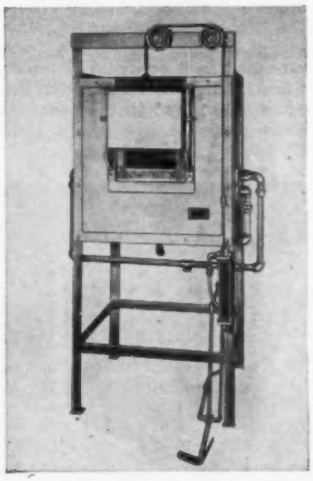
Engineering Representatives in Principal Cities

Furnaces and Heaters—Temperature Measurement and Control—Accessories and Supplies

Furnace, Oven-Type, Heat-Treating

National Gas Furnace Co., 112 Point St., Providence, R. I. (Vol.81,p.1168.)

Designed for use with controlled atmospheres for heat-treating high-speed steel, the "Equilib" furnace incorporates a circulating oven-type con-

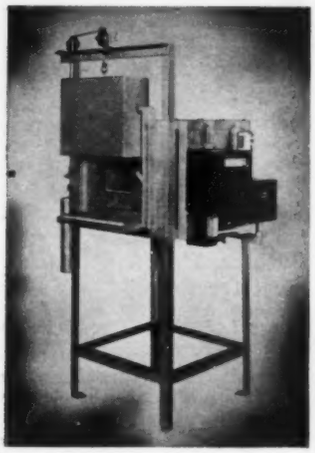


struction. This consists of U-shaped tray sections of high strength and wear-resisting qualities, providing a uniformly heated work chamber and recirculation of the furnace atmospheres. These furnaces are available in four sizes, with hearth dimensions ranging from 8x12 to 15x21 in.

Furnace, Electric, Muffle-Type

H. O. Swoboda, Inc., 4301-3 Main St., Pittsburgh, Pa. (Vol. 81,p.140.)

The "Falcon" high-temperature electric muffle furnaces are suitable for operating temperatures up to 2,300 F. Refractories are reversible for forming muffle chambers, or separate muffles can be supplied. Inside dimensions of the 6-kw. furnace

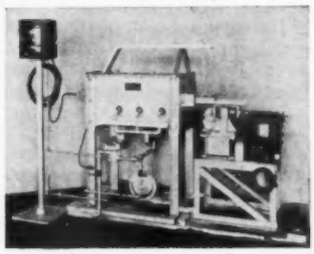


shown are 9 in. wide, 6 in. high and 13 in. deep. Furnaces are available in various chamber sizes and capacities.

Furnace, Full-Muffle, Reciprocating

American Gas Furnace Co., Elizabeth, N. J. (Vol.81,p.884.)

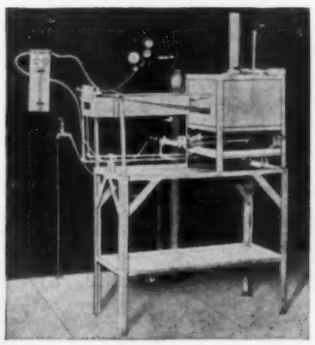
A full muffle is employed in the No. 180 heating machine rather than the open-hearth of former designs. Means are provided for sealing at the discharge end so that the work passes through the furnace without coming in contact with products of combustion, or air, from the time it enters the furnace until it is quenched. Any desired atmosphere can be carried in the furnace.



Furnace, Annealing, Hydrogen

Baker & Co., Murray & Austin St., Newark, N. J. (Vol.81,p. 1172.)

This gas-fired annealing furnace is an adaption of the standard gas-fired toolroom unit. Pre-heated hydrogen, or other

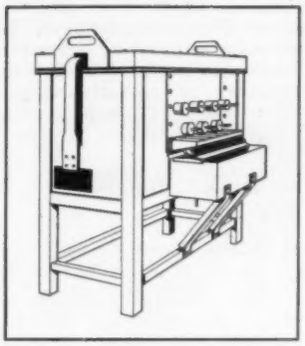


deoxidizing gases, flow into the heating chamber where they reduce the oxide which may occur upon the surfaces of the metal under treatment. Upon completion of the annealing cycle, the tray is pushed into the cooling chamber in the rear.

Furnace, Electric, Heat-Treating

Bellis Heat Treating Co., Branford, Conn. (Vol.81,p.629.)

Heated internally by the resistance of a salt bath to low

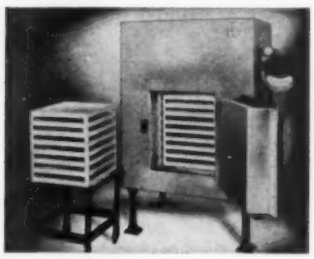


voltage electric current passed between electrodes, these furnaces have been designed primarily for heating aluminum alloy, in the form of sheets and rivets, to 700-900 F. A resistor coil is designed to draw an almost constant value of current.

Furnace, Cross-Flow, Heat-Treating

Despatch Oven Co., 622 Ninth St., S. E., Minneapolis, Minn. (Vol.81,p.183.)

This cross-flow, forced-draft furnace was designed for heat-treating Duralium parts. After the various parts are punched and pressed into shape, they are loaded in a special nesting



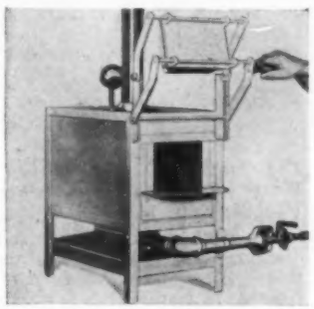
tray arrangement which is then placed in the oven. Heat-treatment is at 925 to 950 F. for a period of 20 min. Inside working dimensions are 19 in. wide, 18 in. deep and 24 in. high.

Furnaces, Box-Type, Tempering

The Philadelphia Drying Machinery Co., 3351 Stokley St., Philadelphia, Pa. (Vol.81,p. 1281.)

Design of these box-type convection heating furnaces allow for cross circulation and for operation from 300 to 1,300 F., with an internal combustion

chamber to eliminate heat losses from ducts. Full automatic control is provided and each furnace is gas fired by means of a low-pressure burner. The smaller furnace shown has a 24x24x28 in. heating chamber and is designed to accommodate 600 lb. of tool steel. Operating range is from 200 to 800 F. Four removable trays are provided. The larger furnace has a 36x36x36 in. chamber and accommodates approximately 1,000 lb. of tool steel. Operating range is from 300 to 1,200 F. There are five removable trays.



Furnace, Annealing

Baker & Co., Murray & Austin Sts., Newark, N. J. (Vol.81,p. 1235.)

This toolroom annealing furnace has a temperature range up to 2,000 F. without using blower or compressed air. Walls have refractory insulation over 3-in. thick. Cast chrome-nickel floor is claimed to be sagless and long lived. Three sizes are available.

Furnace, Drawing and Tempering, No. DT-6

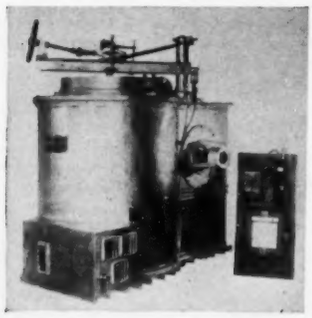
Despatch Oven Co., 622 Ninth St., S. E. Minneapolis, Minn. (Vol.81,p.885.)

Construction of the No. DT-6 convected-air, gas-fired furnace for drawing and tempering dense loads, has been improved so that the door seals only by its own weight. Unit is arranged for a maximum temperature of 1,200 F. This furnace is designed particularly for all types of dense loads as well as for coarse loads.

Furnace, Air-Draw, "Rotair"

Eclipse Fuel Engineering Co., Rockford, Ill. (Vol.81,p.1003.)

The "Rotair" is a recirculating-type furnace in which the blower gives continuous and

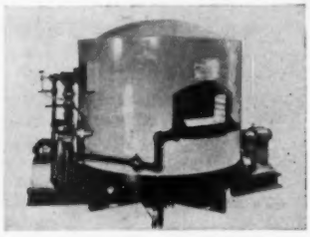


rapid circulation of the hot gases through the load. Seven sizes are available, with basket sizes ranging from 12 in. diameter by 16 in. deep to 28 in. diameter by 28 in. deep. Operating range is 350 to 1,200 F.

Furnace, Rotary, Water-Sealed

The Gas Machinery Co., 16100 Waterloo Rd., Cleveland, Ohio. (Vol.81,p.1002.)

One attendant can charge and discharge the entire output of this rotary-hearth furnace. Hearth is water sealed and a syphon-vent construction, built



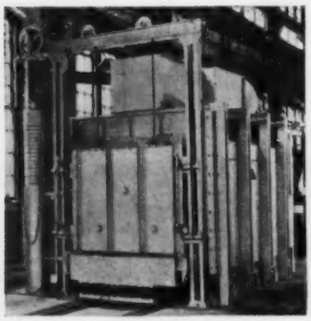
into the side wall of the furnace, carries water vapor out of the furnace so that it cannot enter the heating chamber.

Tangential-burner firing and a circular combustion chamber are claimed to insure close and constant control of temperature and atmosphere throughout all parts of the heating chamber.

Furnace, Convection, Car-Type

The Philadelphia Drying Machinery Co., 3351 Stokley St., Philadelphia, Pa. (Vol.81,p. 1286.)

Inside working dimensions of this car-type convection-heated furnace are 5 ft. wide, 8 ft. long and 4 ft. high above the deck of the car. It is designed for stress-relieving machine parts and cast-iron motor

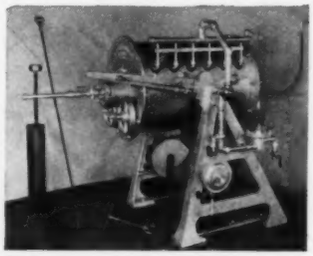


frames. Both door and car are of the self-sealing type. Insulation consists of refractory brick plus insulated block. Temperature of operation ranges from 300 to 1,300 F. on any predetermined cycle.

Carburizer, Rotary, No. 1-F

American Gas Furnace Co., Elizabeth, N. J. (Vol.81,p.884.)

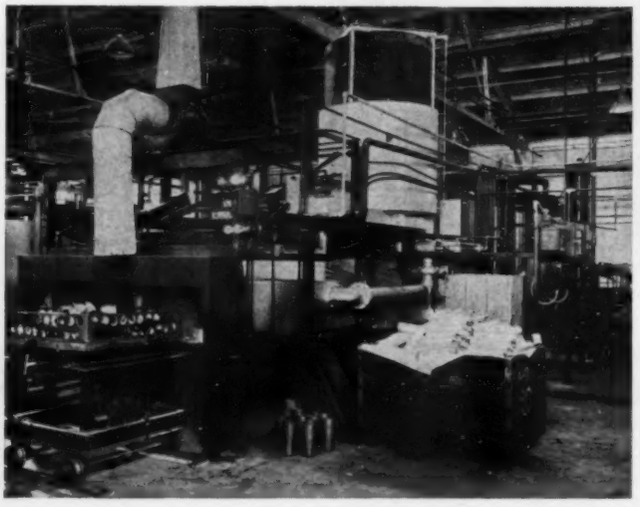
Improvements in the No. 1-F rotary gas carburizer include a lining of insulating refractory backed by block insulation. This unit is fired from one side only, permitting the flames and products of combustion to sweep freely entirely around the retort. Burners are balanced from front to back.

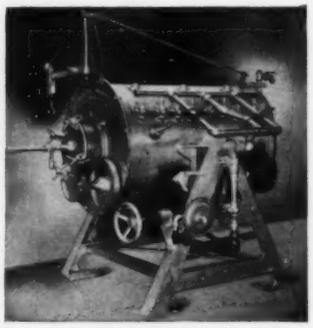


Furnace, Annealing, Recuperative-Type

The Electric Furnace Co., Salem, Ohio. (Vol.81,p.1230.)

This return, recuperative-type furnace was developed for scale-free annealing of miscellaneous stampings of various shapes and sizes. Parts are loaded into skeleton-type trays or pans and automatically are pushed into the furnace through a lock chamber. The material then passes into a recuperating chamber, through which the pans progress at regular intervals into the heating chamber. At the far end of this chamber, the pans are conveyed automatically across the heating chamber to a return, or discharge line and then automatically pushed back through a return line in the recuperative chamber and out into the lock chamber onto a transfer car. Equipment shown has capacity for annealing 3,300 gross pounds per hour at a temperature of 1,650 F.





Carburizer, Rotary, No. 2-B-37

American Gas Furnace Co., Elizabeth, N. J. (Vol.81,p.467.)

Improvements in the 600-lb. capacity rotary carburizer, listed as No. 2-B-37, includes a furnace lining of an insulating refractory backed by block insulation, which is claimed to give lower gas consumption. Burners are of heat-resisting alloy and fire into high-temperature burner tunnels. A flame which sweeps entirely around the retort with uniform heating at all points is secured by grouping burners at one side of the machine.

Furnaces, Tube-Type

Sentry Co., Foxboro, Mass. (Vol.81,p.884.)

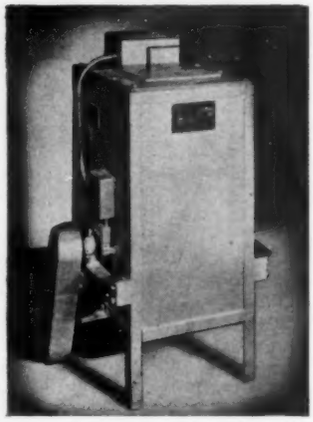
Available in both single and double-tube models, Model V, high-temperature tube furnaces have spring-mounted heating

elements which are readily replaced while the furnace is hot. These electrically heated furnaces are available with several tube sizes and are designed primarily for combustion analysis procedures.

Furnace, Laboratory, "Cyclone"

Lindberg Engineering Co., 221 Union Park Court, Chicago, Ill. (Vol.81,p.631.)

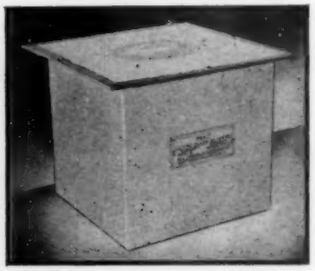
The laboratory-type "Cyclone" furnace has a work chamber 8 in. diameter by 10 in. deep. Plug-type cover is easily lifted for inserting the load. Electric heating elements are mounted in a separate chamber. Slab insulation keeps heat loss at a minimum throughout the temperature range up to 1,250 F.



Brazing Pot, Dip-Type

Miac Products Co., Fort Wayne, Ind. (Vol.81,p.382.)

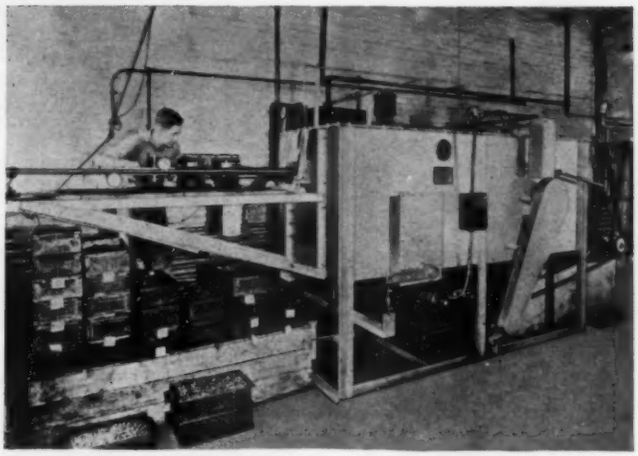
This electric dip brazing pot for silver solders is to all practical purposes an electrically heated furnace, being insulated so that radiation to the outside is practically nil. Size of unit is 8 in. wide by 7 in. deep with a ¾-in. flange around the top for mounting flush with a bench surface. It operates on 110-120 volt a.c.



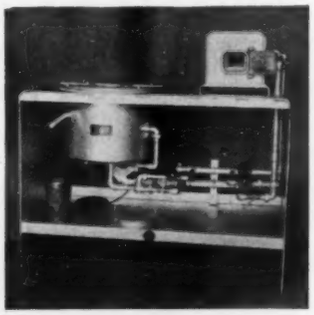
Furnace, Electric, Heat-Treating

General Electric Co., Schenectady, N. Y. (Vol.81,p.887.)

This electric hardening furnace is equipped with a plate-belt type conveyor and a tray-loading device. Conveyor belt is



8 in. wide. Unit shown was designed for scale-free hardening of drill-chuck sleeves and has a 5 ft. long heating chamber. Electrical capacity is 24 kw. Complete installation for this application includes the furnace, an electric drawing unit and degreasing equipment.



Furnace, Table Unit

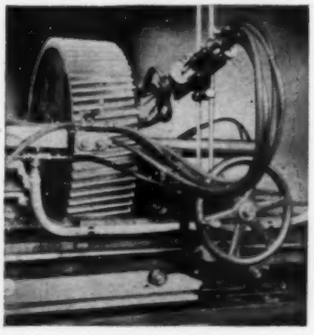
American Gas Furnace Co., Elizabeth, N. J. (Vol.81,p.1284.)

Pot furnace unit of this furnace table is suitable for soft metal melting, lead hardening, cyaniding, or other salt bath heat-treating. A cast-iron pot is available for melting aluminum. Forge has a depth of 4 in. and a 3 in. wide by 2½ in. high opening. This opening is fitted with an insulated door.

Hardening Machine, Gear Tooth

Farrel-Birmingham Co., 344 Vulcan St., Buffalo, N. Y. (Vol. 81,p.421.)

Although this flame-hardening machine has been designed especially for double helical or herringbone teeth, it is equally

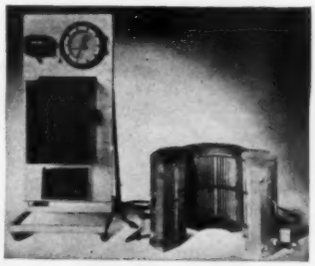


suitable for hardening single helical or straight tooth gears; also splines and rolling-mill wabblers, as well as sprocket wheels and other similar articles. Each of the two heads carries two sets of torches, or tips, so that both sides of a tooth are hardened simultaneously. In operation one torch head starts hardening at one end of the tooth and the other torch head at the other end of the double helical tooth. A guide roller, fixed on the torch saddle, engages the gear being hardened and revolves the gear in correct relationship to the horizontal traverse of the torches.

Heater, Stress-Relieving, "Falcon"

H. O. Swoboda, Inc., 4301-3 Main St., Pittsburgh, Pa. (Vol. 81,p.222.)

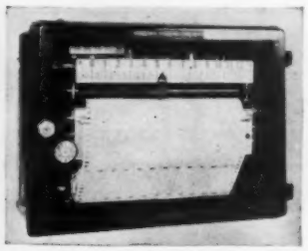
This "Falcon" stress-relieving heater is arranged in three sections for clamping around welded pipe or pressure vessels ranging from 8 to 12 in. diam., with a maximum thickness of 1¼ in.



Pyrometer, Recording and Controlling

Brown Instrument Co., 4501 Wayne Ave., Philadelphia, Pa. (Vol.81,p.885.)

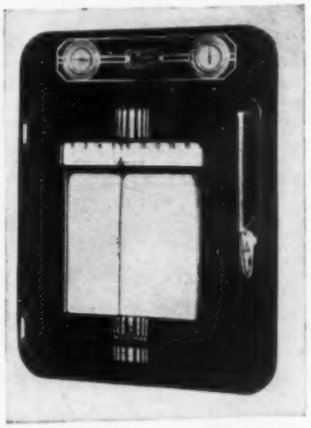
This multiple-recording and controlling potentiometer pyrometer operates on the balanced "Wheatstone" bridge principle and has all of the inherent features of standard potentiometer pyrometers. These features include the 40-in. slide wire, inclosed galvanometer, and a synchronous motor drive. From two to six temperatures from as many different thermocouples can be recorded and controlled.



Potentiometer, Controller

Taylor Instrument Companies, Rochester, N. Y. (Vol.81,p.902.)

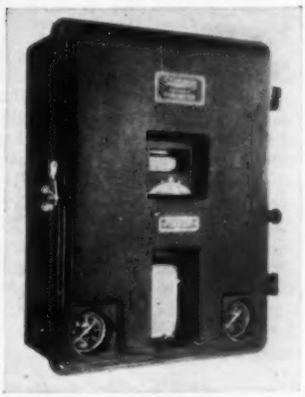
The "Fulscope" Micromax controller is an air-operated potentiometer controlled for process problems where smooth, proportional valve action is imperative.



Potentiometer, Controller

Foxboro Co., Foxboro, Mass. (Vol.81,p.888.)

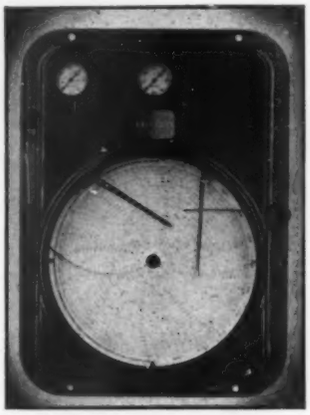
Recent improvements in the "Stabilog" potentiometer controller are claimed to increase the reliability of the instrument. Resistance coils have been inclosed.



Pyrometer Controller

Bristol Co., Waterbury, Conn. (Vol.81,p.634.)

The "Pyromaster" round-chart potentiometer-type pyrometer controller, is available in both pneumatic and electric types. Standard thermocouples and extension leads are used and the instrument is suitable for direct ink-marking on 12-in. round charts.



Pyrometer, "Pyramid," Portable

Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill. (Vol.81, p.225.)

The "Pyramid" pyrometer features accurate calibration, maintained through a thumbscrew adjustment on the face of the dial. Pistol grip handle forms a housing for the pyrometer mechanism.

Pyrometer, Precision

The Pyrometer Instrument Co., 102 Lafayette St., New York, N. Y. (Vol.81,p.1233.)

Designed for measuring the temperatures of very small objects, the "Micro-Optical" pyrometer provides a twenty-fold magnification of the object. To obtain the best results, this instrument is used with a rigid support.

Pyrometer Controller

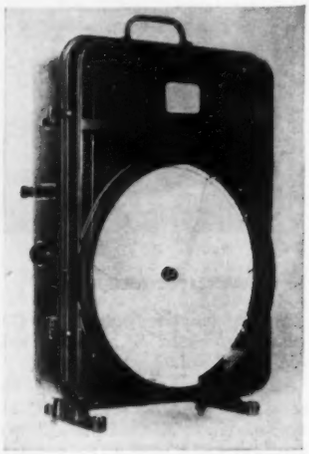
Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago, Ill. (Vol.81,p.1061.)

Designed automatically to control the temperature of heat-treating furnaces, melting pots or other heating devices, the "Alnor" pyrometer controller operates on an electronic principle similar to a radio circuit.

Pyrometer, Portable

Bristol Co., S. Main St., Waterbury, Conn. (Vol.81,p.1237.)

It is claimed that the "Pyromaster" portable pyrometer does not require careful leveling while in use and is said not to be affected by vibration. Using standard thermocouples, these portable instruments are available as thermometers.



Pyrometer, Pyro, "Bi-Optical"

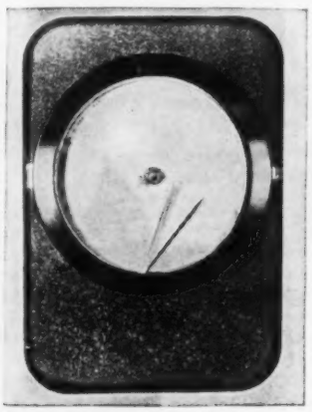
Pyrometer Instrument Co., 103 Lafayette St., New York, N. Y. (Vol.81,p.888.)

Light filters and color wedges, which are transparent to a number of colors simultaneously, are used in the Pyro "Bi-Optical" pyrometer for the measurement of temperatures.

Pyrometer, Indicating, Portable

Bristol Co., S. Main St., Waterbury, Conn. (Vol.81,p. 469.)

This millivoltmeter - type, portable, indicating pyrometer for measuring temperatures up to 3,000 F., has movement which is double-pivoted and is completely shielded.



Recorders and Controllers, Temperature

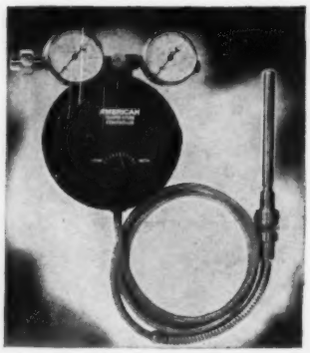
Partlow Corp., 2 Campion Rd., New Hartford, N. Y. (Vol.81, p.888.)

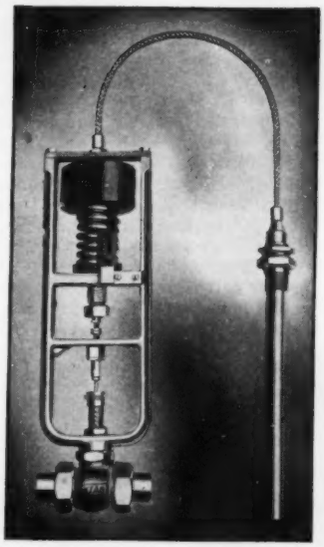
This line of temperature recorders and recording-controllers uses mercury-actuated flexible control elements in which a specially designed diaphragm seals the mercury. Models AR and ARM recording-controllers will accurately control and record temperatures up to 1,000 F. Models AP and APF temperature recorders are designed for use up to 1,000 F.

Controller, Temperature and Pressure

American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Bridgeport, Conn. (Vol.81,p.592.)

This wide-range non-indicating controller, Type No. 2426, is housed in a small 4½ in. case and is designed to replace hand-control units for temperature and pressure regulation. Temperature type has a graduated range from —30 to 500 F. Pressure type has a graduated range of from 15 to 500 lb.





Controllers, Temperature

C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. (Vol.81,p.265.)

Improvements in the "TAG" line of self-operating temperature controllers include a new design of flexible seamless metal bellows and several minor refinements.

Thermometer, Dial

American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Bridgeport, Conn. (Vo.81,p.593.)

Dial thermometers, claimed to have the accuracy of high grade glass thermometers and provided with an adjustment whereby the dial can be tilted to the angle of greatest visibility, are available in 4½- and 6-in. dial sizes and have adjustable pointers.

Temperature Detector, "Instagraph" Electronic

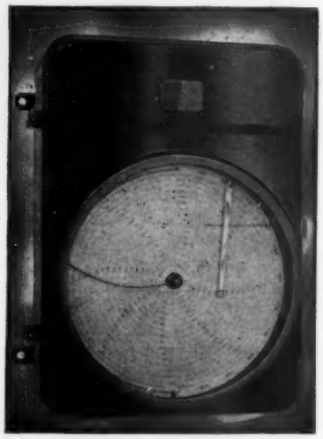
The Bristol Co., S. Main St., Waterbury, Conn. (Vol.81,p. 887.)

Standard radio tubes are used in the amplifying system of the electronic "Instagraph" for accurately recording rolling mill temperatures.

Potentiometer

Bristol Co., S. Main St., Waterbury, Conn. (Vol.81,p.264.)

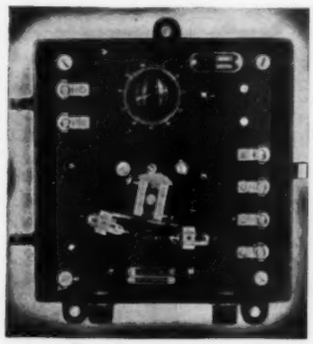
The Pyromaster recording potentiometer of the round-chart type is available as a pyrometer, tachometer, resistance thermometer, millivoltmeter and milliammeter.



Thermometer, Recording

Bristol Co., Waterbury, Conn. (Vol.81,p.1119.)

This portable recording thermometer is designed for use in traveling baking ovens, finishing ovens, and similar installations. It can be passed through the oven on the conveyor.



Anticipating Device, "B-Linator"

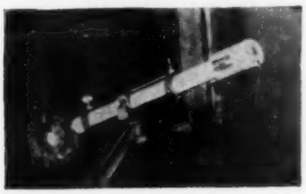
Bristol Co., South Main St., Waterbury, Conn. (Vol.81,p. 426.)

A device, known as the "B-Linator," enables pyrometer controllers to anticipate temperature changes and to correct the fuel consumption long enough in advance to prevent the temperature from cycling.

Temperature Detector, "Rayotube"

Leeds & Northrup Co., Philadelphia, Pa. (Vol.81,p.385.)

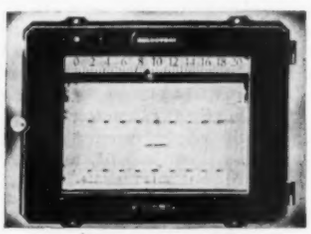
The "Rayotube" temperature detecting instrument is designed to replace the ordinary thermocouple in the reading of furnace or kiln temperatures.



Recorder, Multipoint, High Speed

C. J. Tagliabue Mfg. Co., Park Place & Nostrand Ave., Brooklyn, N. Y. (Vol.81,p.383.)

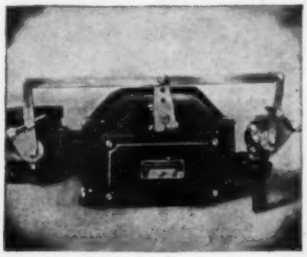
"TAG Celectray" high speed multipoint recorder for temperatures uses a sensitive mirror galvanometer in place of the customary metal boom or pointer.



Controller, Furnace

Automatic Temperature Control Co., 34 Logan St., Philadelphia, Pa. (Vol.81,p.141.)

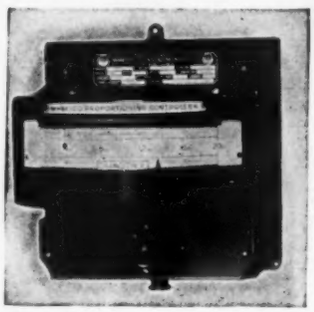
The ATC "Balancer" is designed to regulate the fluctuations of such variables as temperature and pressure by the movement of valves or other correcting devices in amounts exactly proportional to the deviation of the variable form desired normal.



Controller, Furnace

Wheelco Instruments Co., 1112-14 Milwaukee Ave., Chicago, Ill. (Vol.81,p.886.)

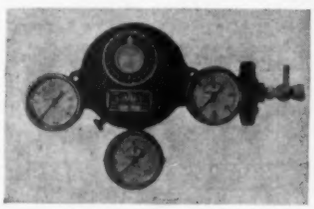
Designed to provide constant temperatures for fuel-fired or electrically heated units, regardless of varying heat requirements, the Proportioning Capacitrol balances the heat input against the heat required by the work.



Ink, Chart

Permochart Co., Koppers Bldg., Pittsburgh, Pa. (Vol.81,p.1170.)

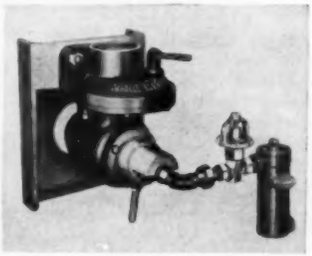
A recording chart ink has been developed for use on the renewable permanent recording charts offered by this company.



Controller, Pressure

Industrial Instrument Co., 96 E. Miller Ave., Akron, Ohio. (Vol.81,p.1284.)

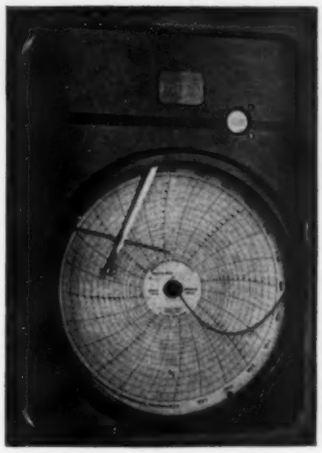
The "Summit" air-operated type Model 19 pressure controller is claimed to maintain constant pressure on the equipment to which it is connected. It is sensitive to less than ¼ lb. pressure change.



Meters, Flow

Bristol Co., Waterbury Conn. (Vol.81,p.185.)

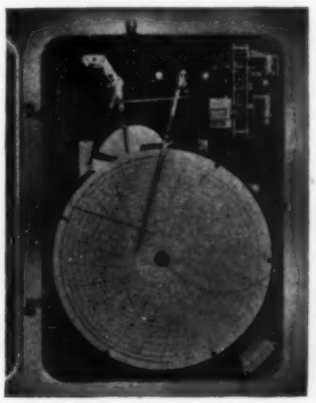
These electric flow meters operate on the "Metameter" principle of telemetering and can be furnished for recording, integrating and indicating flow of steam, liquids and gases.



"Permocharts"

Permochart Co., Koppers Bldg., Pittsburgh, Pa. (Vol.81,p.470.)

"Permochart" is a smooth, hard-surfaced recording meter chart for use in all cases where ordinary paper charts are destroyed after one day's use. It is made from a wrinkle-proof, waterproof, non-inflammable material which can be cleaned by the use of a damp cloth.



Meter, Flow

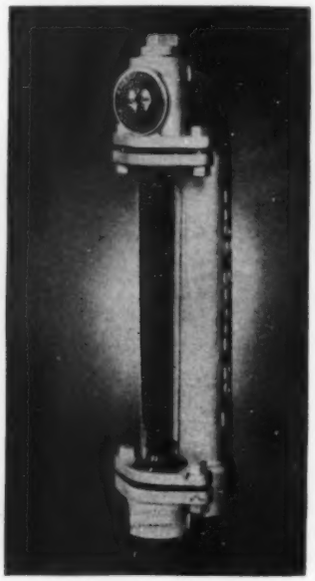
Bristol Co., Waterbury, Conn. (Vol.81,p.758.)

The electric integrator for use with flowmeters has a flat disk cam which mechanically computes the square root of the differential pressure across an orifice plate or venturi tube construction in a pipe line at 15-sec. intervals.

Burner, Oil or Gas

Mahr Mfg. Co., Minneapolis, Minn. (Vol.81,p.1295.)

Using either oil or gas, properly prepared for combustion, this triple atomizing burner delivers the combustible mixture to the combustion duct or chamber in the correct form and at the correct velocity to produce maximum heat from a given volume of fuel.



"Flowmeters"

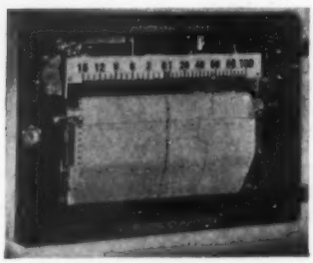
American Gas Furnace Co., Elizabeth, N. J. (Vol.81,p.718.)

"Flowmeters" for measuring the flow of air and gases to obtain control of gas burning operations and carburizing have a float in a transparent, calibrated taper tube. Position of the float indicates the flow and permits direct reading of the volume in cubic feet per hour.

Recorder, Atmosphere

Brown Instrument Co., 4501 Wayne Ave., Philadelphia, Pa. (Vol.81,p.27.)

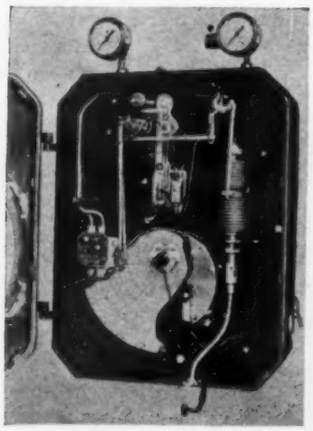
The "Analy-Graph" furnace atmosphere control recorder is of the potentiometer type and is graduated so as to render the equipment applicable for measuring atmosphere quality resulting from complete or incomplete combustion, or from dissociation.



Cement, Insulation

George F. Pettinos, Inc., 1206 Locust St., Philadelphia, Pa. (Vol.81,p.1238.)

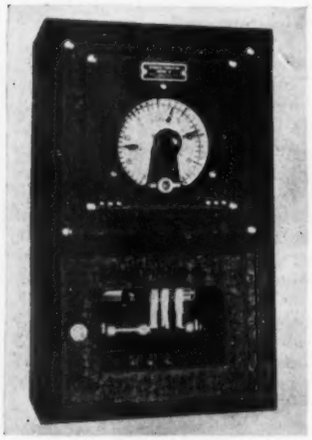
Claimed to be particularly suitable for annealing, forge and electric furnace insulation, "Sonittep" insulation cement can be applied by unskilled labor. Suitable for temperatures up to 2,000 F. and claimed to check air infiltration.



Instruments, Recording

Taylor Instrument Companies, Rochester, N. Y. (Vol.81,p. 1118.)

A line of instruments makes possible the accurate measurement and control of compressible fluids at low pressures by referring measurement to absolute zero pressure.



Timer, Furnace-Firing

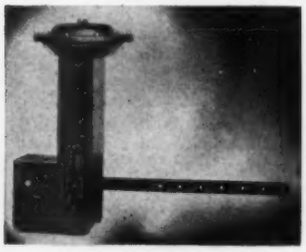
Automatic Temperature Control Co., 34 E. Logan St., Philadelphia, Pa. (Vol.81,p.886.)

Designed to control, on a time basis, the firing of furnaces which are fired at opposite ends, the timer shown is provided with a dial having two setting pointers and one moving pointer.

Motor, Lever

Taylor Instrument Companies, Rochester, N. Y. (Vol.81,p. 634.)

Action of the "Motosteel Evenaction" lever motor can be reversed by substituting another lever and transposing the fixed and movable pivots. Limit stops are provided.



Ignition System

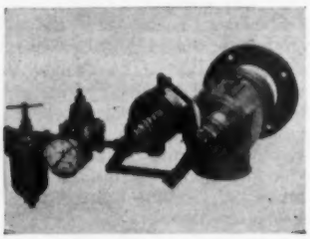
Eclipse Fuel Engineering Co., Rockford, Ill. (Vol.81,p.889.)

This automatic blast-tip ignition unit is designed automatically to recycle in case of air, gas, ignition, or electric failure until service is resumed.

Burner, Oil

Hauck Mfg. Co., 121 Tenth St., Brooklyn, N. Y. (Vol.81,p.888.)

Movement of a single lever simultaneously regulates air and oil supply to this proportioning oil burner. Correct air-oil ratio is automatically proportioned and maintained.



Conveyor, Furnace-Type

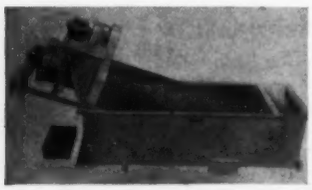
General Alloys Co., 409 W. First St., Boston, Mass. (Vol. 81,p.583.)

"Spiralink" conveyor belt is offered for use in industrial furnaces for temperatures up to 2,000 F. It is designed to equalize the load.

Quencher, Spiral

G. S. Blakeslee & Co., 19th St. and 52nd Ave., Chicago, Ill. (Vol.81,p.886.)

Hopper design of the "Niagara" spiral quenching machine has been improved to make it possible to install a gasketed, air-tight connection to the chute to prevent oxidation of the hot work as it leaves the furnace.



Container, Heat-Treating

American Manganese Steel Co., Chicago Heights, Ill. (Vol.81,p. 633.)

The Hoffman "Flexbox" container, for carburizing, annealing and other heat-treating processes, is made of six separate parts of heat- and abrasion-resistant "Amsco" alloy.

Carburizer, Liquid

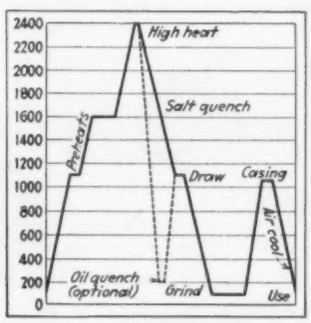
Chapman Valve Mfg. Co., 203 Hampshire St., Indian Orchard, Mass. (Vol.81,p.1172.)

"Valcase" liquid carbuerizer is a fused salt-bath mixture that is claimed to be readily melted in ordinary pot-furnaces without excessive fuming or smoking. Case depths, ranging from 0.015 in. in 20 min. to 0.045 in. in 4 hr., can be obtained.

Cycle, Steel-Treatment

E. F. Houghton & Co., 240 W. Somerset St., Philadelphia, Pa. (Vol.81,p.1166.)

A comprehensive cycle of high-speed steel treatment is shown in the accompanying diagram. For the preheat, a neutral hardening salt, which will neither carburize nor decarburize, is used. For high heat, the "Liquid Heat No. 2400"



salt is recommended. Work may then be quenched in oil or a salt-bath. After being drawn, work is ground and a case is superimposed by a further liquid bath.

Hardening Bath

A. F. Holden Co., New Haven, Conn. (Vol.81,p.1240.)

It is claimed that molybdenum steels can be successfully hardened by a process that excludes the tools from any atmospheric attack by being processed through the bath from the time of immersion until below a scaling temperature by a film of salt on the outside of the tool.

Holden High-Speed 17-25 is used at the high temperatures in a ceramic pot, which is claimed to eliminate the possibility of iron contamination.

Salt Bath "Liquid Heat 980"

E. F. Houghton & Co., 240 W. Somerset St., Philadelphia, Pa. (Vol.81,p.1230.)

Claimed to be a good medium for tool hardening and production reheating purposes where an absolutely neutral bath is desired, but where a high operating temperature is not necessary.

Alloy, Low-Creep

Calorizing Co., Wilkinsburg Sta., Pittsburgh, Pa.

Calite BL-28 alloy, developed for use as castings in furnace construction, is of the 25 per cent chromium—10 per cent nickel type and is stable at high temperatures.

Brick, Insulating

Johns-Manville, 22 E. 40th St., New York, N. Y. (Vol.81,p. 885.)

No. JM-20 insulating brick is claimed to possess the physical properties necessary for service under temperatures as high as 2,000 F.

Insulation, "Sonittep"

Geo. F. Pettinos, Inc., 1206 Locust St., Philadelphia, Pa. (Vol.81,p.1175&1292.)

Suitable for temperatures up to 2,000 F., "Sonittep" castable insulation requires no reinforcement and is claimed to withstand shocks and vibration.

Finely ground to permit thin joints, "Sonittep" high-temperature cement has been improved so that it will withstand any condition where firebrick is applicable.

Insulation

Quigley Co., Inc., 56 W. 45th St., New York, N. Y. (Vol.81, p.1175&1237.)

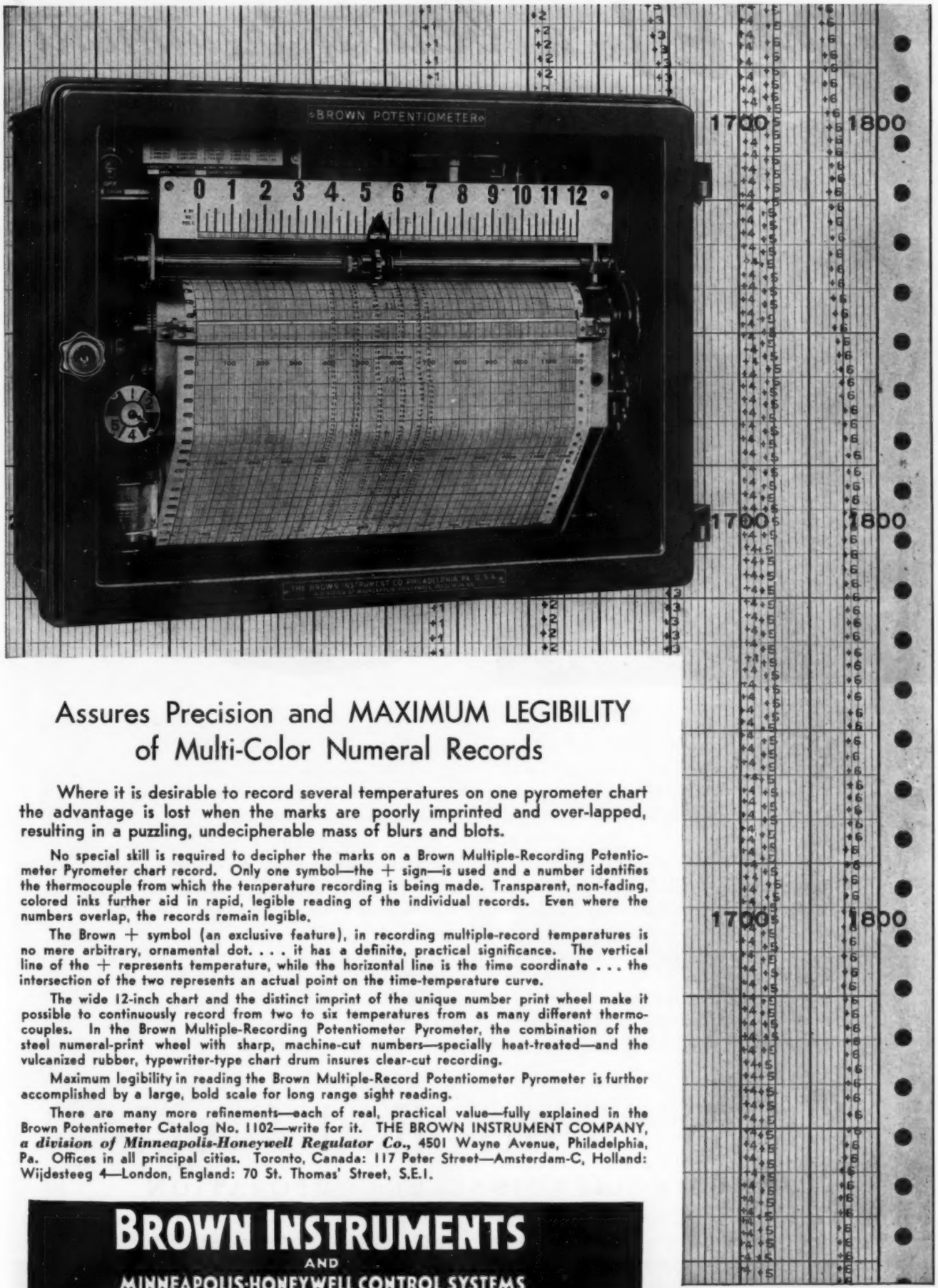
Reduced heat storage and radiation losses at operating temperatures up to 2,200 F. are claimed for "Insulblox," a light-weight, low-heat storage refractory block insulation.

"Insulag," a refractory lagging designed for use on high-temperature equipment, may be applied on hot surfaces of flues, ducts, or drums; also on refractory brick and concrete.

Refractory

Botfield Refractories Co., Swanson & Clymer Sts., Philadelphia, Pa. (Vol.81,p.1176.)

"Adachrome-Cast" refractory is suitable for forming monolithic hearths in all types of heating furnaces and can be used for reverberatory furnaces.



Assures Precision and MAXIMUM LEGIBILITY of Multi-Color Numeral Records

Where it is desirable to record several temperatures on one pyrometer chart the advantage is lost when the marks are poorly imprinted and over-lapped, resulting in a puzzling, undecipherable mass of blurs and blots.

No special skill is required to decipher the marks on a Brown Multiple-Recording Potentiometer Pyrometer chart record. Only one symbol—the + sign—is used and a number identifies the thermocouple from which the temperature recording is being made. Transparent, non-fading, colored inks further aid in rapid, legible reading of the individual records. Even where the numbers overlap, the records remain legible.

The Brown + symbol (an exclusive feature), in recording multiple-record temperatures is no mere arbitrary, ornamental dot. . . . it has a definite, practical significance. The vertical line of the + represents temperature, while the horizontal line is the time coordinate . . . the intersection of the two represents an actual point on the time-temperature curve.

The wide 12-inch chart and the distinct imprint of the unique number print wheel make it possible to continuously record from two to six temperatures from as many different thermocouples. In the Brown Multiple-Recording Potentiometer Pyrometer, the combination of the steel numeral-print wheel with sharp, machine-cut numbers—specially heat-treated—and the vulcanized rubber, typewriter-type chart drum insures clear-cut recording.

Maximum legibility in reading the Brown Multiple-Record Potentiometer Pyrometer is further accomplished by a large, bold scale for long range sight reading.

There are many more refinements—each of real, practical value—fully explained in the Brown Potentiometer Catalog No. 1102—write for it. THE BROWN INSTRUMENT COMPANY, ***a division of Minneapolis-Honeywell Regulator Co.***, 4501 Wayne Avenue, Philadelphia, Pa. Offices in all principal cities. Toronto, Canada: 117 Peter Street—Amsterdam-C, Holland: Wijdesteeg 4—London, England: 70 St. Thomas' Street, S.E.1.

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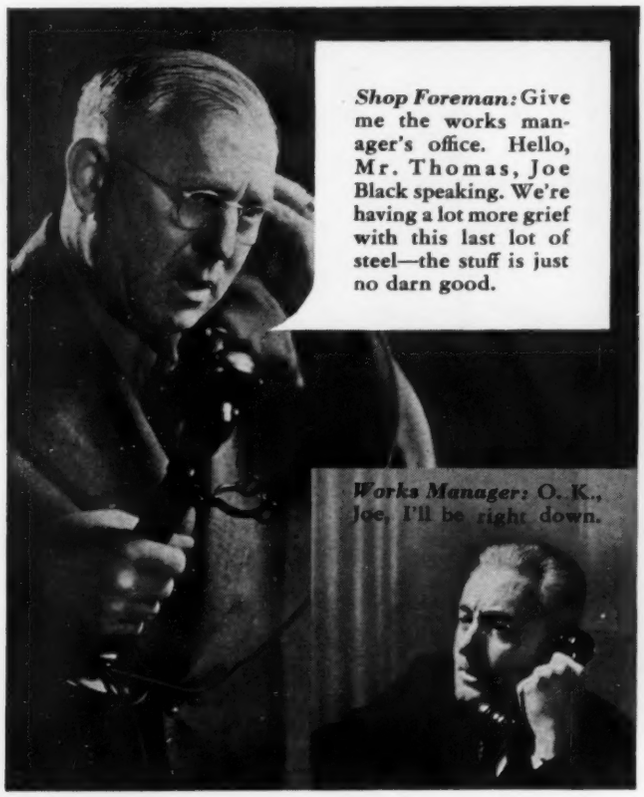

Shop Foreman: Give me the works manager's office. Hello, Mr. Thomas, Joe Black speaking. We're having a lot more grief with this last lot of steel—the stuff is just no darn good.
Works Manager: O. K., Joe, I'll be right down.

Works Manager: The Rockwell in this steel should run between 58 and 63 shouldn't it?
Shop Foreman: Yes, Mr. Thomas, but look what we're getting.
Rockwell
C 37
60
57

AN application of Controlled Steel has smoothed out many a worried brow. For here is a trouble chaser that in the last few years has reduced spoilage and rejection losses, brought down costs in plants all over the country.

What are Controlled Steels, you ask. Briefly, they are steels for forging, forming, heat-treating and machining in which *all* quality factors are definitely predetermined. They are steels in which the physical properties are kept consistently uniform . . . in shipment after shipment. They are steels in which those "mysterious differences"—that make it so difficult to obtain uniform results with ordinary steels—have been eliminated by scientific metallurgical control.

We've been making Controlled Steels for quite a while now. We know how to analyze your fabricating processes and how to give you the right kind of steel to do the best job for you at least cost. Why not invite one of our metallurgists to look over your production line and to prescribe Controlled Steels where he thinks they will do the most good. It costs nothing to have him call.

U·S·S Controlled Steels

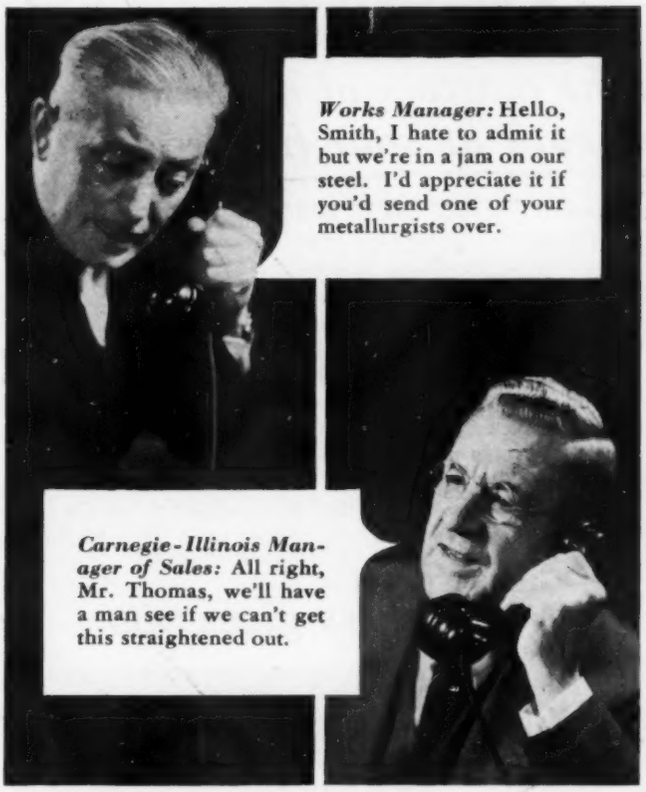
CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

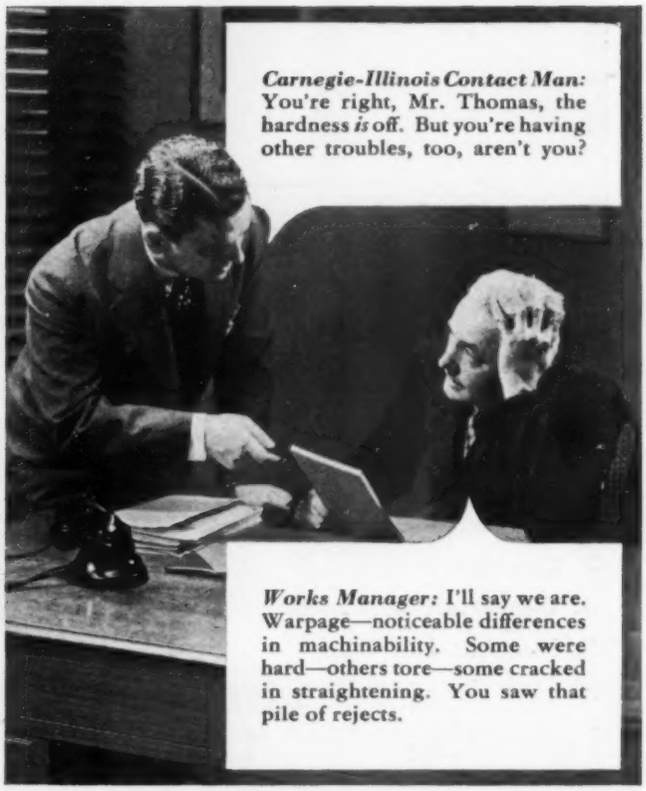
UNITED STATES STEEL

for wrinkled foreheads!



Works Manager: Hello, Smith, I hate to admit it but we're in a jam on our steel. I'd appreciate it if you'd send one of your metallurgists over.

Carnegie-Illinois Manager of Sales: All right, Mr. Thomas, we'll have a man see if we can't get this straightened out.

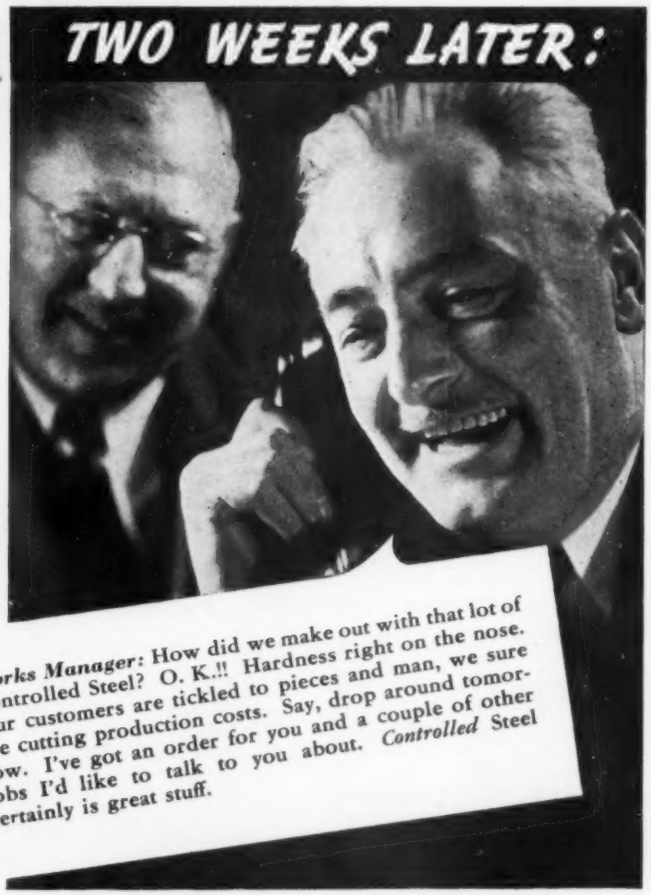


Carnegie-Illinois Contact Man: You're right, Mr. Thomas, the hardness *is* off. But you're having other troubles, too, aren't you?

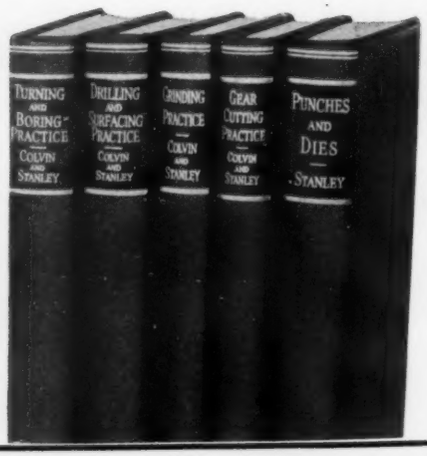
Works Manager: I'll say we are. Warpage—noticeable differences in machinability. Some were hard—others tore—some cracked in straightening. You saw that pile of rejects.

Carnegie-Illinois Contact Man: Well, Mr. Thomas, that sounds to me like non-uniform steel. Wide variations like you're getting might be related to steel quality. I'd like you to try Carnegie-Illinois Controlled Steel.

Works Manager: All right, send us a sample order and we'll give it a trial.



Works Manager: How did we make out with that lot of Controlled Steel? O. K.!! Hardness right on the nose. Our customers are tickled to pieces and man, we sure are cutting production costs. Say, drop around tomorrow. I've got an order for you and a couple of other jobs I'd like to talk to you about. *Controlled* Steel certainly is great stuff.



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Many charts and tables

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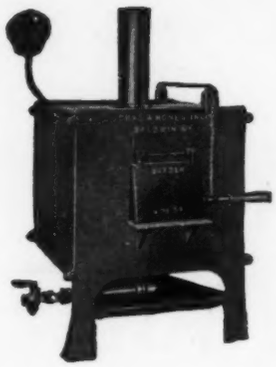

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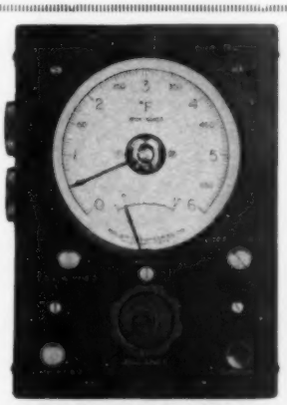

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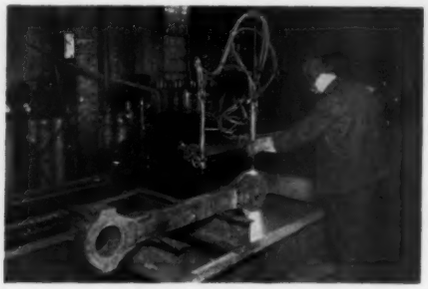

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Welding

CLOSE CONTROL of welding variables is recognized as essential to good welds and practically all of the spot, seam and resistance welding machines now offered incorporate means for exercising this control. A number of units have electronic-tube control units that hold the time of current application within a few cycles of desired limits.

A universal spot welder recently announced has a lower arm that can be placed in any one of three positions to accommodate work of various shapes. A variety of electrode holders, available for use with this unit, are arranged so that the points can be swivled to almost any angle.

Another spot welder, especially designed for welding aluminum, includes a main welding transformer, a separate auto-transformer and two electronic control panels in its electric circuit. An unusual feature of this installation is a bell which warns the operator if the welding variables are not in the right value or sequence for current operating conditions. There is also a recording device which charts the variables for each weld and permits study of all factors for a given weld.

Portable spot-welding guns are finding increased application, particularly in the automotive body field. Automatic equipment controls welding variables and, once the controls are set for a given set of conditions, the operator only has to carry the gun about the welding fixture and make the necessary welds.

Special seam welders are being installed for a wide range of purposes. One of these units, recently installed, welds joints in wire racks and refrigerator shelves in production quantities. Another welder was specially designed for seam-welding the flanged edges of two halves of refrigerator compressor housings to form a pressure tight unit. An interesting feature of this machine is the fact that it is inclined so that any oil in the housing being welded will drain away from the seam joint. Vacuum tube timers having a wide adjustment range control the interrupted seam weld in an automatic cycle.

Flame cutting applications are increasing and several new units have features that make possible considerable manufacturing economies. One of these units has a tracing table area of 72 sq. ft. Mechanism for starting, stopping, reversing, increasing or decreasing speed, including control of manual operation is mounted on a single panel for one-hand control by the operator. Master-valve group controls for high-pressure oxygen, low-pressure oxygen and acetylene are provided at six places on the long transverse arm. Another cutting unit is designed for making tees, elbows, miters, Y's and blunt bull plugs as well as cutting holes in pipe from 2½ to 12 in. in diameter. Torch guiding mechanism is claimed to duplicate the motion of a torch held in an operator's hand. Flame-softening, a procedure that reduces the hardness of flame-cut edges of low-alloy steels, is one of the outstanding developments of the past year.

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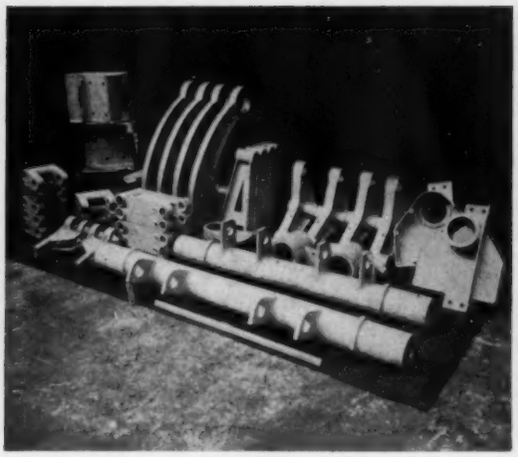
AND IMPROVE YOUR WELDING

Fabricators of welded products of every description are getting their costs down to rock botfom with Murex Electrodes.

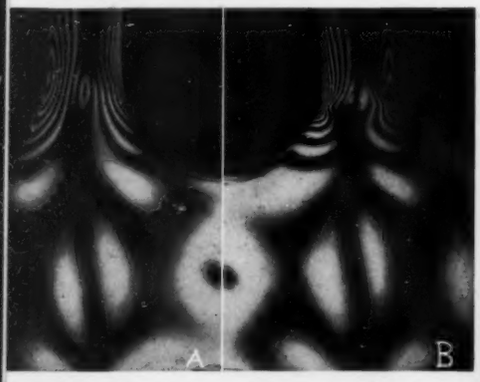
You can make similar savings and, at the same time, be assured of top-notch welding by using Murex. Look into the advantages of these heavy-coated rods. Write for the Murex Booklet. Ask to have a Murex welding expert look over your welding operations.



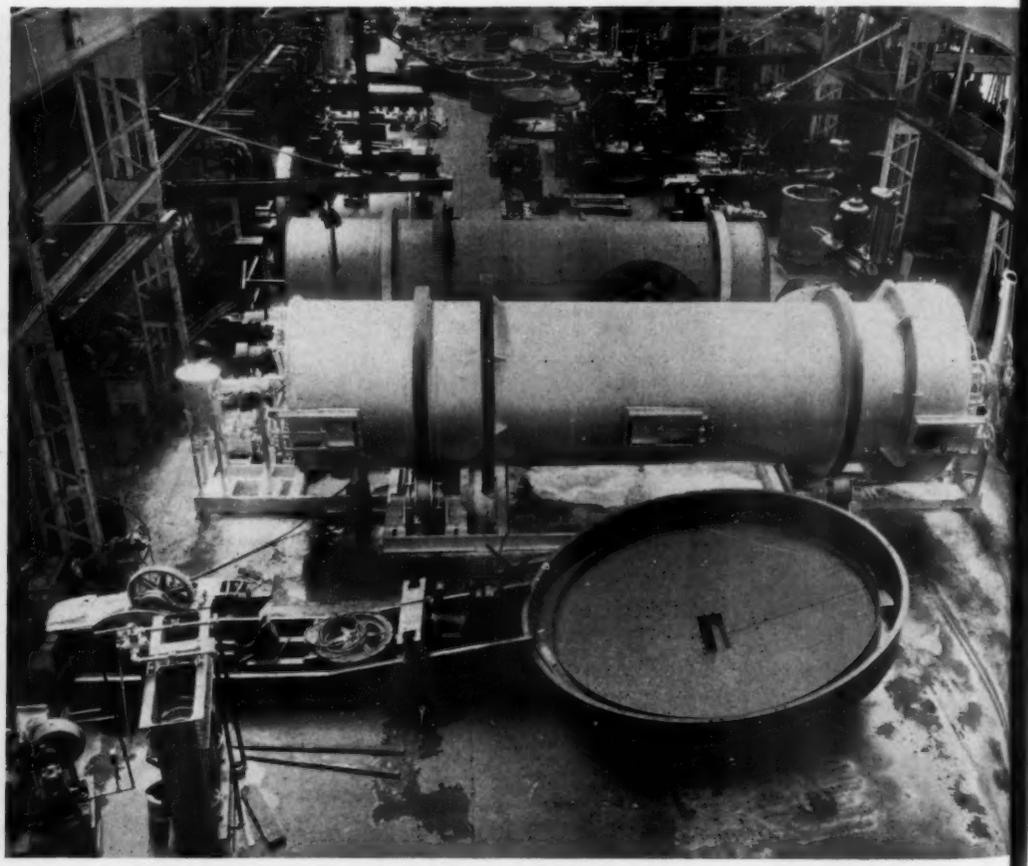
The Murex representative in your territory is experienced, not only in welding procedure, but also in shop practise and production methods. Put him to work on your problems.

1 Smooth, spatter-free Murex welding cuts cleaning time and assures extra savings where fabricated small parts replace castings.

2 Two time-saving features speed work in tight quarters where Murex is used: (1.) Electrodes can be bent, (2.) There's little smoke; no fumes.



3 Compare stress concentrations in Pictures A and B. Assuring well-rounded, concave fillets like those in A is just one way that Murex provides better welding.



4 Welders find it easy to qualify for Class 1 work with Murex. "All our operators passed with flying colors on the first attempt," reports one company.

5 In production work and the fabrication of equipment such as these crystallizers, the higher heats at which Murex is used make remarkable savings. "Heavy fillets are made in 24% less time," says one manufacturer. Another finds Murex "37.5% faster in flat welding."

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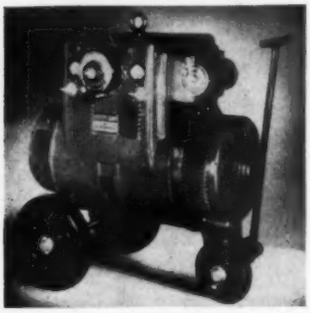
Welders, Arc, Serial MN

Hobart Bros. Co., Canal Lock Sq., Troy, Ohio. (Vol.81,p.218.)

Serial MN current-saving model arc welders are equipped with selective motor-horsepower control. It is claimed that this



feature improves the power factor and efficiency of the machine and that only one-third the usual starting current is required. The models are available in 75, 100, 150, 300, 400 and 600 ampere capacity sizes.

Welder, Arc, Transformer, "Midget Marvel"

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol 81,p.755.)

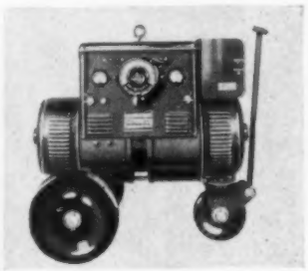
Designed for use in maintenance and repair as well as light production welding, the "Midget Marvel" a.c. welder has twelve points of current ad-

justment which range from 30 to 140 amp. This set is designed for use with coated electrodes ranging from $\frac{1}{16}$ in. to 5.32 in. in diameter. Dimensions: 14$\frac{1}{4}$ in. high, 10$\frac{3}{4}$ in. wide and 17$\frac{7}{8}$ in. long.

Welders, Arc, Magnetically-Controlled

Hobart Bros. Co., Canal Lock Square, Troy, Ohio. (Vol.81,p. 891.)

This line of arc welding units, featuring motor-horsepower control have been redesigned to operate magnetically instead of manually. Complete overload and undervoltage protection is provided. When the welding load is such



as to require the full rated horsepower of the motor, the operator flips a small toggle switch to "high" position and presses the starter button. As soon as the machine comes up to speed, the switch automatically changes over to the normal, full-load running position. If one-half the rated horsepower of the machine is sufficient for the job at hand, the operator flips the toggle switch to "low" position.

Welder, Arc, Transformer

Miller Electric Mfg. Co., Appleton, Wis. (Vol.81,p.140.)

"Miller Standard Arc" welders are available in four models, with capacities from 130 to 300 amp. These light-weight

transformer-type welders are designed without reactance control or sheet-metal attachment and have the same efficiency as the regular welders. Each is equipped with a rotary knife switch control.

Welders, Arc, Transformer

Pier Equipment Mfg. Co., 554 Cross St., Benton Harbor, Mich. (Vol.81,p.470.)

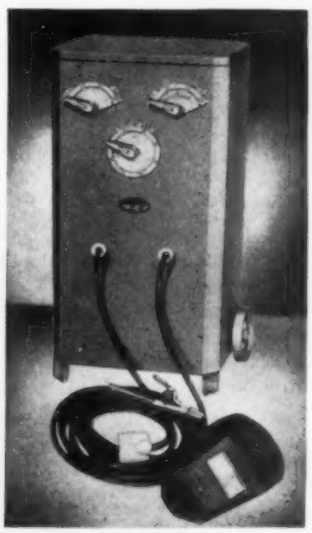
"Ace" arc welders feature a synchro-control which provides correct regulation of both current and voltage for each kind of material and rod size. Model 10 is suitable for production welding with $\frac{1}{16}$-, $\frac{5}{32}$-, $\frac{1}{8}$- and $\frac{5}{32}$-in. coated electrodes. Capacity is 22 gage to $\frac{1}{2}$ in. sheet metal with 150 amp. welding current for 1 hr. Model 20 is

capable of using 250 amp. continuously and uses $\frac{1}{16}$-, $\frac{5}{32}$-, $\frac{1}{8}$-, $\frac{5}{16}$- and $\frac{1}{4}$-in. coated electrodes. This heavy-duty model is suitable for welding up to 1 in. steel.

Welder, Arc, Transformer

Miller Electric Mfg. Co., Appleton, Wis. (Vol.81,p.755.)

The "Dual Control" portable a.c. welder has separate voltage and amperage controls which

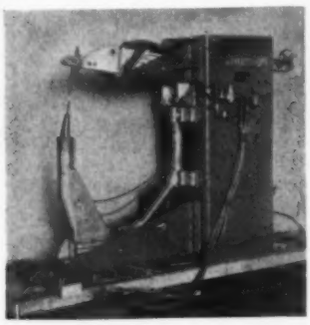


enable the operator to select the most desirable voltage for the amperage used on any job. Welder is built in three sizes with a current range from 10 amp. to that required for heavy sheet metal.

Welder, Spot, "Universal"

Thomson-Gibb Electric Welding Co., 164 Pleasant St., Lynn, Mass. (Vol.81,p.1110.)

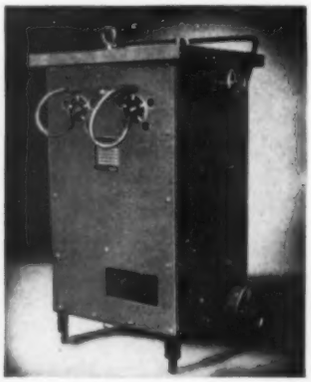
The lower arm of this "Universal" spot welder can be arranged in any one of three positions to accommodate work of various shapes. Both the upper and lower arms can be fitted with a variety of electrode holders, most of which are arranged so that the points can be swiveled to almost any angle. Welder is powered by a 300-kva. transformer and develops welding pressures up to 3,500 lb. Stroke is adjustable from 0 to 6 in. The throat depth is 36 in. when the lower arm is set up in the vertical position, or 42 in. in either the 45 deg. or the horizontal positions.



Welder, Arc, Transformer

Wilson Welder & Metals Co., 60 E. 42nd St., New York, N. Y. (Vol.81,p.630.)

This 150-amp. capacity a.c. transformer-type arc welded is a self-contained unit requiring only the welding cable, elec-

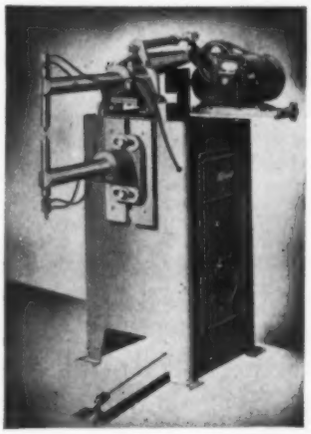


trode holder, and hand-shield. A system of three controls permit coarse and fine adjustments of the welding current.

Welder, Spot, "Type R"

Federal Machine & Welder Co., 212 Dana St., Warren, Ohio. (Vol.81,p.755.)

Type "R" spot welders are available as automatically-

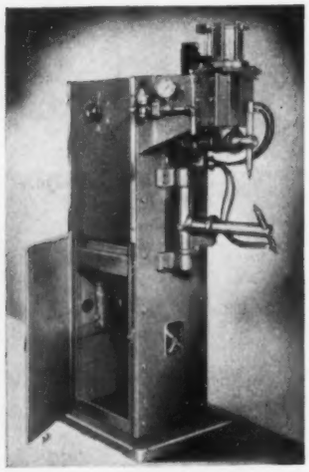


operated or as foot-operated units. This series consists of eight spot-welding machines ranging in capacity from 7½ to 60 kva. Horn diameters range from 1¾ to 2¾ in. diameter and throat depth ranges from 6 to 48 in. by increments of 6 in. The automatic-drive unit has a variable - speed arrangement which allows 30-90 or 72-216 strokes per min.

Welder, Spot, Model AP-35-S

Armglo Co., Milwaukee, Wis. (Vol.81,p.671.)

Especially designed for welding stainless steel and galvanized iron, the Model AP-35-S spot welder has a timing range from 2 to 35 cycles. This makes possible welding stainless steel in gages ranging from No. 20 to No. 12. Water-

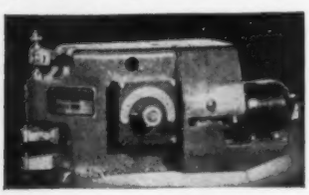


cooling, pressure control and automatic timing prevent the stainless steel from losing any of its corrosion-resistant properties. Capacity in spot welding sheet steel is from two pieces of No. 21 gage to two pieces of No. 7 gage clean steel. Weight, 1,800 lb.; floor space required, 24x30 in.; height, 56 in.

Welder, Spot, Bench-Type

Thomson-Gibb Electric Welding Co., 164 Pleasant St., Lynn, Mass. (Vol.81,p.25.)

This bench-type spot welder has all the precision features of a standard floor-type welding press. Capacity is two pieces of $\frac{1}{8}$ in. clean iron or steel. It has a pressure range of 25 to 100 lb., and a throat depth of 4¾ in. Net weight is 450 lb. Over-all dimensions are 15¾ in. wide by 32 in. long, by 17¾ in. high.



Welder, Spot, For Aluminum

Thomson-Gibb Electric Welding Co., 164 Pleasant St., Lynn, Mass. (Vol.81,p.223.)

This spot-welder designed for use in welding aluminum includes the welder proper and main welding transformer, together with a separate auto-

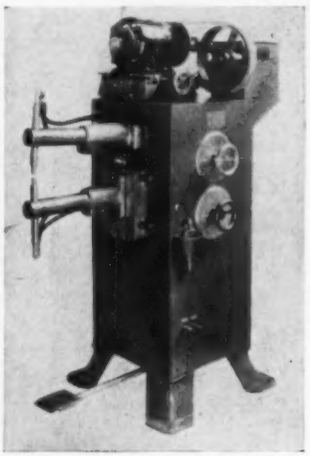
transformer and two electronic control panels.

An unusual feature is a bell which warns the operator if the welding variables are not in the right value or sequence for conditions under which the machine is operating. There is also a recording device which charts the value of current flow as each weld is made.

Welder, Spot, Heavy-Duty

Eisler Engineering Co., 770 E. 13th St., Newark, N. J. (Vol. 81,p.891.)

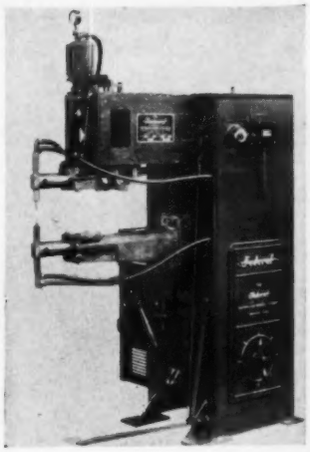
This 35-kva. capacity, heavy-duty spot welder is of the fabricated-box type and is furnished with water-cooled electrode holders. The lower arm has a vertical adjustment to provide for work clearance. An air-cooled transformer, equipped with dual switch control, is provided. There are twelve points of regulation. Machine has capacity to weld a combined thickness of $\frac{1}{8}$ in. of steel or any steel-base metal.



Welder, Spot, Type P-1

Federal Machine & Welder Co., 212 Dana Ave., Warren, Ohio. (Vol.81,p.902.)

Listed as the P-1 Series, these press-type spot welders are available in six capacities, ranging from 20 kva. mini-



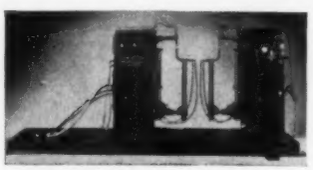
mum to 75 kva. maximum. Three different types of pressure devices are available, namely direct air pressure, direct cam pressure, and air and toggle pressure.

The illustration shows a welder of the P-1 series equipped with an air and toggle pressure device. The horns shown on this machine are standard water-cooled type electrodes, but universal-type horns with electrodes placed at an angle can be furnished.

Welders, Spot, Duplex

Acme Electric Welder Co., 5621-23 Pacific Blvd., Huntington Park, Los Angeles, Calif. (Vol. 81,p.425.)

Special duplex air-operated spot welders are designed for fabricating refrigerator cases, filing cabinets and similar parts. Welding capacity can be varied according to installed transformer capacity. Standard

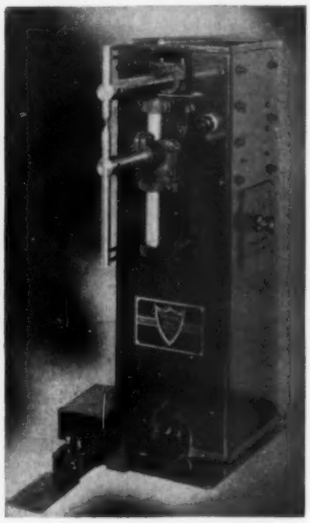


depth of throat of each unit is 12 in. Opening between electrodes is approximately 1½ in. One welder is stationary and one welder is mounted on a carriage which can be moved by means of a handwheel for a minimum spread of 10 in. and a maximum spread of 58 in.

Welder, Spot, Model D

Taylor-Hall Welding Corp., 99 Hope Ave., Worcester, Mass. (Vol.81,p.584.)

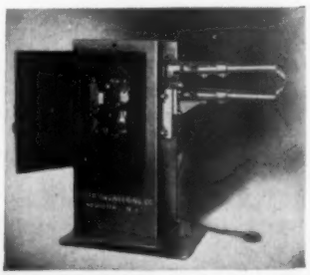
Horns and electrodes of the Model D spot welding machine, available in 10, 17 and 25 kva. sizes, are water-cooled and pressure is adjustable from 25 to 250 lb. Movement of upper electrode may be up to 2½ in. in a vertical direction. Transformer and upper horn assembly are used as the pressure unit with an easily adjustable counterweight for light and medium work.



Welder, Spot, Air-Operated

Eisler Engineering Co., 770 S. 13th St., Newark, N. J. (Vol. 81,p.627.)

Interchangeable arms, available for use with this spot welder, permit a wide variation in type of work performed. A water-cooling arrangement passes water through the arm, electrode holders and electrodes.



This welder is claimed to be capable of making up to 100 spot welds per min. It is equipped with an 8-point hand wheel for heat regulation and has an air-cooled transformer. Timer is adjustable to regulate current from 2 to 60 cycles in 110 divisions. An air pressure valve permits regulation of welding pressure.

Welder, Resistance, "Multi-Spotmatic"

Thomson-Gibb Electric Welding Co., 164 Pleasant St., Lynn, Mass. (Vol.81,p.184.)

The "Multi-Spotmatic" resistance welding machine shown has four transformers, a series of hydraulic plungers which act in sequence and a special work-carrying table. Indexing is arranged so that rows of spot welds can be made at fixed positions across the work. Rotary control valve located on the front of the machine controls the pressure and duration

of current flow for each individual weld and permits variation in the thickness of metals being welded. Swith cams are adjustable to permit a long or short period of current dwell. Arrangement of welding points can be altered.

Gun, Spot-Welding, Hydraulic

Progressive Welder Co., 737 Piquette Avenue, Detroit, Mich. (Vol.81,p.383.)

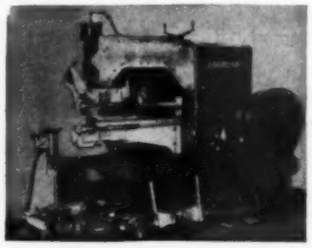
Designed for sheet-metal assembly, the hydraulic spot-welding gun is claimed to give increased production because of its compact design and ease of

handling. No cables are required, as the upper and lower pressure bars of the welding fixture are used as conductor bars. Transformer and booster are built into the fixture, making a compact set-up. Timing is automatic as is the application of hydraulic pressure.

Welder, Seam, "Universal"

Thomson-Gibb Electric Welding Co., 16½ Pleasant St., Lynn, Mass. (Vol.81,p.1162.)

Adaptable for longitudinal and circular seam welding, the "universal" seam welder will weld aluminum, stainless steel and non-ferrous alloys. Longi-



tudinal seam welding is performed with the heads shown, while an alternate head and lower arm are substituted for circular seam welding. In addition, there are two special heads with an assortment of short-circuiting rolls that can be mounted on a special bracket for series welding.

Welding Fixtures, Special

Progressive Welder Co., 737 Piquette Ave., Detroit, Mich. (Vol.81,p.582.)

This company will design and manufacture spot-welding fixtures for use with the hydraulic welding gun. Copper bus-bars are cast to fit the parts to be

welded. Parts to be welded are clamped and positioned in the fixture by quick-acting devices. Transformer and hydraulic booster for the welding gun are mounted on the fixture. It is only necessary to connect to air, water and electrical supply lines to put the equipment in operation.

Gun, Spot-Welding, Portable

Progressive Welder Co., 737 Piquette Ave., Detroit, Mich. (Vol.81,p.261.)

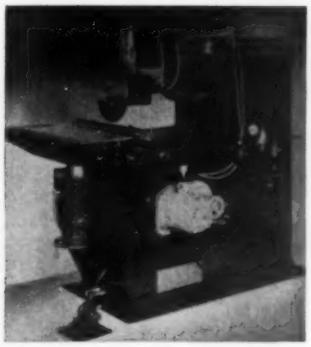
This portable, hydraulic, automatic spot-welding gun is a production unit designed for assembling sheet metal parts. The hydraulic booster is capable of pressures ranging from 0 to 3,000 lb. Finger-tip control for varying this pressure is provided on the gun and insures correct pressure for all working conditions.

Timing devices control electric current input, and once the controls are set for a given set of conditions, the automatic equipment leaves nothing to chance.

Welder, Roll-Type "Hot-Spot"

Acme Electric Welder Co., 5621-23 Pacific Boulevard, Huntington Park, Los Angeles, Calif. (Vol.81,p.381.)

This semi-automatic, variable-speed, motor-driven and air-operated special roll welder is designed for welding wire

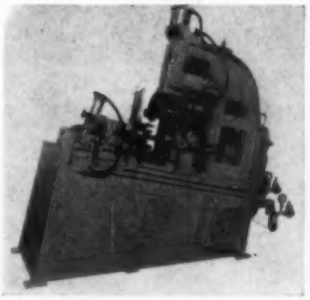


racks, refrigerator shelves, or any cross-wire welding. The machine has welding capacity for $\frac{3}{16}$ to $\frac{1}{4}$ in, round or flat steel cross wires, joined to selvage or supporting steel wire of $\frac{1}{2}$ in. round or smaller. The table has a full 5 in. vertical adjustment and measures 13 in. wide by 48 in. long.

Welder, Seam, Special

Federal Machine & Welder Co., 212 Dana St., Warren, Ohio. (Vol.81,p.1052.)

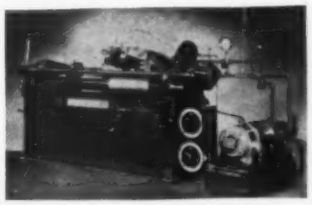
Designed to weld the flanged edges of two halves of refrigerator compressor housings and to make a pressure-tight seam weld that will prevent escape of gases and liquids, this electric welder is rated at 440 volts, 60 cycles, 250 kva. This welder is designed to sit at an angle so that any oil in the housing will drain away from the joint being welded. When the operating button is pushed, the pneumatic cylinders press the upper electrode against the edges of the flange and the work and electrode rotate, making an interrupted seam weld.



Welder, Flash, Model F-29

Thomson-Gibb Electric Welding Co., 16½ Pleasant St., Lynn, Mass. (Vol.81,p.339.)

With capacity for 3½-in. high-carbon steel drill shanks or high-speed steel cutting ends, the Model F-29 precision flash welder is claimed to weld 25

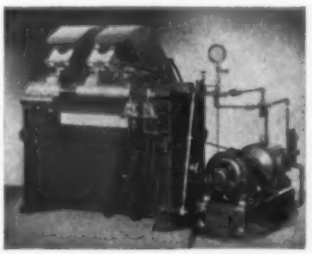


to 80 small size drills per hour. Larger size drills can be welded at the rate of 10 to 25 per hr. Air-operated, vertical open-end type clamps are an integral part of the machine platens. Voltage regulation is by means of taps with 8 points of voltage regulation for welding and 8 points for annealing.

Welder, Tube, Model F-21

Thomson-Gibb Electric Welding Co., 16½ Pleasant St., Lynn, Mass. (Vol.81,p.425.)

Developed especially for service in flue welding shops, the Model F-21 flash welder is equipped with a 150 kva. transformer. Push-up pressure is supplied by a hydraulic cylin-



der and an air pressure pump. Dies are water cooled and are adjustable for vertical alignment. Accurate heat control is provided. This welder has capacity for flues up to 6 in. diameter and double extra-heavy pipe up to 2½ in. diameter. Floor space, 77x55 in.; overall height, 55 in.; net weight, 6,840 lb.

Cutter, Shape, No. 612

National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill. (Vol.81,p.890.)

The No. 612 is a flame-shaping machine capable of cutting a wide variety of shapes from steel plates, slabs, billets or forgings. Table is mounted on the steel lengths of fabricated construction and the tracing table has an unbroken rectangular working area of 72 sq.ft. Fabricated carriage is designed to hold the long transverse

arm in a horizontal position so that the torch cannot run "down hill." Machine has a cutting range 6 ft. wide by 12 ft. long and requires a floor space 14 ft. wide by 16 ft. long.

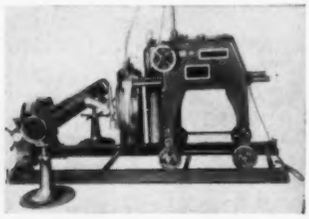
Arm is fabricated of aluminum alloy and heat-treated aluminum struts are used to brace the arm. Carriage wheels on the right side have rounded faces, running in V-type rails, while those on the left side are flat, running on a flat rail. This construction is claimed to prevent binding and to assure both rolling freedom and accuracy.

Wheels on the transverse carriage have rounded rims, like those on the right side of the table carriage. Accurate cuts are possible, either parallel or at right angle to the main guide rail, by locking the main carriage or transverse carriage in fixed relation to each other. Circles are cut with a movable center plate and an adjustable trammel arm.

Cutting Machine, Torch

Oster Mfg. Co., 2057 E. 61st St., Cleveland, Ohio. (Vol.81, p.1117.)

Cutting torch of the No. 222 cutting machine is guided by a mechanism which duplicates the motion of a torch held in the operator's hand. It will



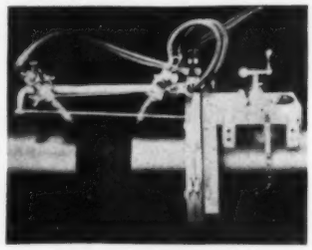
cut pipe from 2½ to 12 in. diameter, making tees, reducing tees, branch reducing tees, elbows, miters, Y's and blunt bull plugs, as well as cut holes in pipes of these diameters. Beams are marked to show the settings for the various sizes and types of cuts.

Case containing the generating mechanism is mounted on four legs which are equipped with flanged wheels running on a track. Pipe is centered in a vise and supported on roller pipe rests, if the length requires additional support, for straight cutting. If a hole is to be cut in the pipe, it is placed at right angles to the torch carrier, on the roller pipe rests. Settings of the generating mechanism are regulated by positioning a rotating beam or lever, which operates a reciprocating slide.

Cutting and Beveling Machine

Linde Air Products Co., 205 E. 42nd St., New York, N. Y. (Vol.81,p.864.)

The Oxweld Type CM-13 pipe cutting machine has been designed for pipe cutting and beveling operations in the industrial field, for quickly and economically preparing pipe for welding. Severed sections of pipe fall free at the finish of a cut. Channel ring and blowpipe rotate around the entire circumference of the pipe.

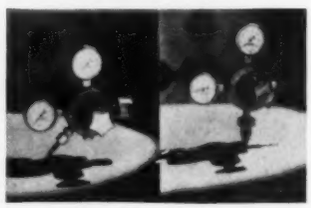


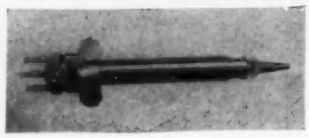
Ring is actuated during the cutting operation by inclosed gears which can be released by means of a friction clutch for hand rotation. Located in the ring is a detachable valve body which serves as a connection between the sources of oxygen and acetylene and the machine. An additional blowpipe may be mounted on the extension arm, making the machine adaptable for double cutting and beveling. The machine is adjustable for cutting or beveling 8 to 12 in. diameter pipe.

Regulators, Gas, "Prest-O-Weld"

Linde Air Products Co., 30 E. 42nd St., New York, N. Y. (Vol.81,p.220.)

Two regulators for oxy-acetylene welding have front caps of die-cast brass to assure lightness with strong construction. The accurate gages are easy to read for both cylinder content and operating pressures. The R-110 oxygen regulator, left, is finished in green and the R-111 acetylene regulator, right, in red to conform with accepted standards. Operating principles of these regulators are typical of single-stage regulators, but refinement in detail is said to give increased accuracy and sensitivity. Reinforced, vulcanized rubber diaphrams are used.





Blowpipe, Oxweld, Type C-35

Linde Air Products Co., 205 E. 42nd St., New York, N. Y. (Vol.81,p.866.)

The Oxweld Type C-35 cutting blowpipe, for machines which require a blowpipe not longer than 10½ in., has a combination injector, making it possible to use it with either a low-pressure or medium-pressure acetylene source. Blowpipe can be used with only two hoses and regulators. However, there are three hose inlets, so oxygen supply to the preheat can be regulated.

Gasfluxer, Automatic

Automatic Gasflux Co., 620 Frankfort Ave., Cleveland, Ohio. (Vol.81,p.1238.)

Brazing flux is automatically dispensed by this "Gasfluxer" unit. Gas line is run through the unit and, as the gas passes through it is impregnated with a special flux. The flux then travels with the gas to the

torch tip and is expelled in the flame. No changes are required in torches, tips or regulators.

This flux has a very low melting point and creeps ahead of and is always under the brazing puddle. It is claimed to penetrate thoroughly and quickly, preparing the metals in such a way that a tight weld is secured. The accurately controlled, automatic fluxing is said to form a joint free from the deposit ordinarily left on the weld when a dry flux is used. This eliminates the need for a pickling operation and little grinding is necessary to clean up the weld. Units can be arranged to provide flux for as many torches as required on a single line.

Regulators, Gas, Oxweld

Linde Air Products Co., 205 E. 42nd St., New York, N. Y. (Vol.81,p.25.)

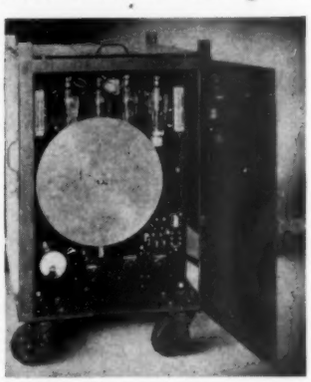
A series of three regulators provides accurate oxygen and acetylene regulation through the entire range of welding and cutting operations. Type R-64 oxygen regulator is designed

for operations requiring pressures up to 75 lb. per sq.in. Type R-65 oxygen regulator is designed for heavy-duty cutting which may require pressures as high as 200 lb. per sq.in. Type R-66 acetylene regulator is a companion piece for either of the oxygen regulators.

Control, Seam Welder

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol. 81,p.142.)

This seam welder control times power impulses, in terms of a definite number of power cycles, to a wheel-type electrode resistance welding ma-

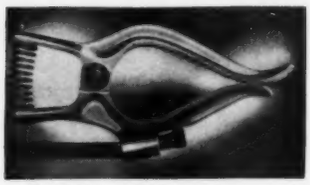


chine. Among its features is an inductive timer, consisting of a synchronous-driven disk rotating once per second and containing 120 holes, each corresponding to a half cycle of welding current. Steel pins are plugged into the holes according to the timing desired.

Clamp, Ground, Welding Cable

Tweco Products Co., 829 S. Madison, Wichita, Kan. (Vol. 81,p.633.)

Having capacity up to 500 amp. and a jaw opening of 2½ in., the "Redhead" ground clamps make possible a quick, positive and portable connec-

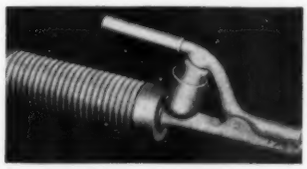


tion for welding cables. Overall length is 10 in. and weight is 3 lb. A tapered screw terminal wedges into the body to give a positive connection.

Holder, Electrode, Model B-4

Jackson Electrode Holder Co., 6553 Woodward Ave., Detroit, Mich. (Vol.81,p.810.)

Weighing 15 oz., the Model B-4 electrode holder has a current capacity of 200 amp. and



handles rods ranging from $\frac{1}{16}$ to $\frac{5}{16}$ in. diameter. Upper tong and compression spring are protected by fiber insulation.

The metal parts of this holder are made entirely of Mallory 3 metal, which is claimed to have 85 per cent of the conductivity of pure copper. Holder is small enough to permit use in tight places.

Electrode, Welding, "Fleetweld 9"

Lincoln Electric Co., Cleveland, Ohio. (Vol.81,p.715.)

Developed especially for flat welding deep-groove joints in mild steel, "Fleetweld 9" electrode is claimed to be particularly suitable for parts utilizing heavy-plate construction and requiring high quality butt welds. The metal, as welded, has a tensile strength of 66,000 to 74,000 lb. per sq.in. and a yield point of 50,000 to 60,000 lb. per sq.in. with a 20 to 30 per cent elongation in 2 in.

Proper welding procedure with this electrode is said to overcome conditions frequently encountered in deep-groove welding which tend to cause the formation of surface holes in the metal. The electrode is claimed to have operating characteristics which assure uniformly economical performance. It is designed to operate with either a.c. or d.c. and is made in $\frac{5}{16}$, $\frac{1}{4}$ and $\frac{5}{16}$ in. diameters.

Electrodes, Welding

Electroloy Co., 50 Church St., New York, N. Y. (Vol.81,p.676.)

Standard tapered spot-welding electrodes are offered to replace the conventional machined spot welding tip. Electrodes are cold formed from high conductive alloys and are plated with a thin, electrically conductive coating of a special alloy which is resistant to oxidation. This plate is claimed to reduce heating of the electrode with an increase in the number of spot welds that can be obtained during the life of the tip.

Electrode, Welding, "Shield-Arc 100"

Lincoln Electric Co., Cleveland, Ohio. (Vol.81,p.22.)

"Shield-Arc 100" is a heavily coated electrode of the shielded arc type. It is designed for welding steels of higher strengths than those welded with "Shield-Arc 85" electrodes. This electrode is suitable for flat, vertical and overhead welding. Welds produced by the "Shield-Arc 100" electrode in the higher tensile steels possess an ultimate strength of 100,000 to 105,000 lb. per sq.in. as welded.

Electrode, Welding "Murex"

Metal & Thermit Corp., 120 Broadway, New York, N. Y. (Vol.81,p.23.)

"Murex" Type N coated arc-welding electrode is designed for bridging gaps where fit-up between plates is poor. In smaller sizes it is used for vertical and overhead welding, or for rapid, single-pass welds on light gage materials. Physical properties of the deposited metal range from 74,000 to 84,000 lb. per sq.in. tensile strength with 26 to 24 per cent ductility.

Electrodes, Welding

Una Welding, Inc., 1615 Collamer Ave., Cleveland, Ohio. (Vol.81,p.146.)

The Una 3175 and 3195 shielded-arc electrodes, designed for use in welding low-alloy high-tensile steels, consist of an alloy-base rod with full-shielded coating. The $\frac{1}{8}$- and $\frac{5}{32}$-in. electrodes are recommended for flat, vertical and overhead welding. In fabricating rigid structures using $\frac{3}{4}$-in. plates or heavier of low-alloy, high-strength steel with these electrodes, a stress relief of the complete structure is recommended.

Electrode, Welding, No. 520

Wilson Welder & Metals Co., 60 E. 42nd St., New York, N. Y. (Vol.81,p.146.)

Electrode No. 520 is designed for use with the small transformer type a.c. arc welders. It is claimed that an arc can be struck and maintained without difficulty.

Electrode, Welding

Aladdin Rod & Flux Mfg. Co., Box 935 Madison Sq. St., Grand Rapids, Mich. (Vol.81,p.264.)

"Aladdin Rod," applied according to instructions, makes a weld that is said to have as great a strength as the base material when used for welding white-metal die castings. Reinforcing is not considered necessary.

Electrode, Welding, Compensating

Electric Arc Cutting & Welding Co., 152-156 Jelliff Ave., Newark, N. J. (Vol.81,p.220.)

The "Compensating" arc-welding rod is evenly tapered so that it is small at the starting end and added material is deposited as the rod is used. The rod compensates for current resistance loss in that part of the rod waiting to be deposited. These rods are available as bare, fluxed, dipped and extruded electrodes in all standard sizes. They are suitable for corner and deep V welding.

Electrodes, Welding

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol. 81,p.890.)

"Crucible Weld" coated electrodes are available in sizes from $\frac{3}{32}$ to $\frac{5}{16}$ in. in diameter. A special $\frac{1}{16}$ in. electrode can be used with low current. Electrodes come in two grades, black and brown. The black are claimed to be suitable for down-hand butt welding and for surfaces where the slope is as much as 30 deg. Brown electrodes are recommended for all general-purpose horizontal, vertical and overhead welding and are especially adapted for fillets. They operate on open circuit welding voltages as low as 50 volts.

Electrode, Welding

Air Reduction Sales Co., Lincoln Bldg., New York, N. Y. (Vol.81,p.871.)

The Airco No. 1 high-ductility, alloy-steel rod has been developed to withstand considerable heat with bend ductilities of single-layer welds of 20 to 30 per cent; free bend ductilities of multi-layer welds, up to 40 per cent on low and medium carbon steels; ultimate tensile strength, 60,000 lb. per sq.in. minimum.

Electrode, Welding, "Fleetweld-8"

Lincoln Electric Co., Cleveland, Ohio. (Vol.81,p.427.)

"Fleetweld-8" electrode is designed to eliminate the necessity of multiple-pass welding in production of fillet and lap welds. It is claimed that up to $\frac{3}{8}$-in. fillet welds, with one plate vertical, can be produced in one pass with this electrode.

The electrode is heavily coated for welding by the shielded-arc process. Welds are smooth and dense, with good physical properties.

Electrode, Welding, "Transweld"

Lincoln Electric Co., Cleveland, Ohio. (Vol.81,p.1239.)

Designed for use with small a.c. transformer-type arc welders, "Transweld" electrodes are claimed to have a stable arc which is easy to strike and hold. They are said to be suitable for making all types of welds in flat, horizontal, vertical or overhead positions. Tensile strength is 75,000 to 85,000 lb. per sq.in.

Rods $\frac{3}{32}$, $\frac{1}{8}$ and $\frac{5}{32}$ in. in diameter are available. The smaller size is furnished in 12-in. lengths, the other two in 14-in. lengths.

Clothing, Welders, Protective

Davis Emergency Equipment Co., 55 Van Dam St., New York, N. Y. (Vol.81,p.900.)

A line of protective clothing for welders, complete for both acetylene and arc work, includes goggles, sleeves, aprons, helmets, hand shields, coats, pants, leggings, spats and gloves. Goggles, helmets, and hand shields are equipped with glasses of various shades, each suitable for a special type of work. There are five different shades of goggles, ranging in use from light brazing to heavy welding, and three different shades of glasses.

Helmet, Welding, One-Piece

Willson Products, Inc., Reading, Pa. (Vol.81,p.590.)

This helmet is formed of one-piece of black vulcanized fiber and cut deeply to offer side protection to a point well back of the ear. Riveted, lapped-over seams or joints are eliminated and a smooth, round interior promotes air circulation. "Willson-Weld" 2x4¼ in. glass is used.

HERE'S WHY IT'S CALLED THE ONLY TRUE WELDING GENERATOR

It's the only generator which meets every need for welding current without compromise or corrective measures. It has no external resistors, reactors or separate stabilizers — doesn't need them. Smootharc's smooth current is "built-in" with a patented, internal stabilizer winding which uses arc impulses to speed up flux changes — cuts down current variations to give you a natural, smooth welding arc.

SMOOTHARC WELDERS

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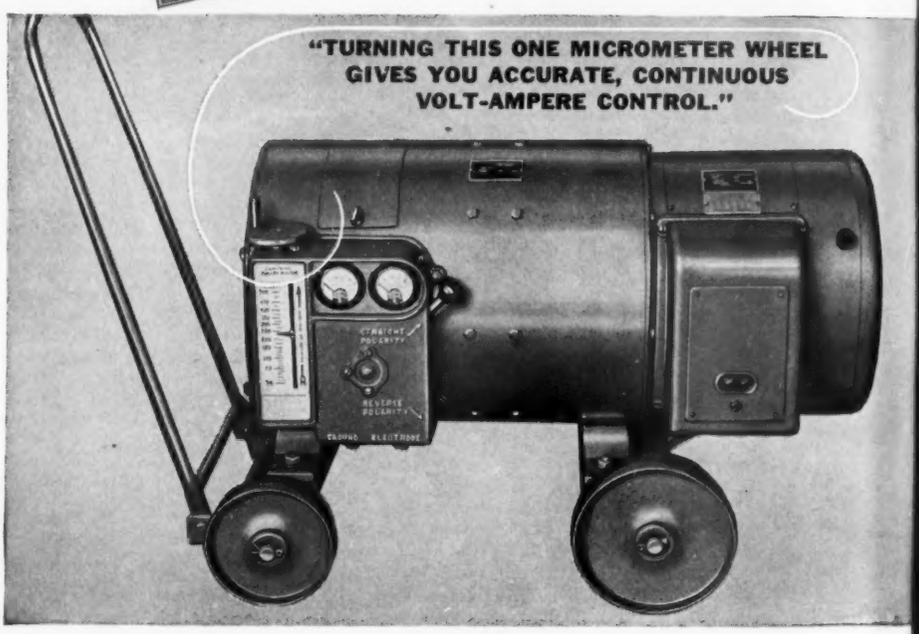
MAKES WELDING EASIER, FASTER

With simple, foolproof regulation and this steadier arc, you can deposit metal faster and easier. Penetration is uniform to insure uniform strength from one weld to another—to reduce the changes for weld failures. No other welding generator can give you this important operating advantage.



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Write for your copy of the new Smootharc Bulletin No. W-10, "The Arc Welding of Tomorrow."

THIS NEW ELECTRODE IS READY

Smootharc "PF" Heavily coated, designed for use on poor fit or irregular joints; can also be used for overhead welding. Develops a tensile strength of 75,000 to 85,000 lbs. per square inch; 20% elongation in 2 inches and a resistance to impact of 30 to 50 pounds. (Izod.) Offered in sizes from $\frac{5}{32}$ to $\frac{1}{8}$ inch. In requesting free samples please indicate size desired . . . Use the coupon.

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ease send information on Smootharc Welders and Welding ectrodes as checked below:

- ☐ Send Bulletin W-10 "The Arc Welding of Tomorrow"
- ☐ Send literature on Smootharc Welding Electrodes
- ☐ Send samples of Smootharc P F Electrodes for Text Purposes Size (_____)

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By one twist of the wrist, the operator sets his "SAE" Current Control to suit the electrode size.

You get 25% extra performance value with a "*Shield-Arc* SAE"

Mr. Harry Wieler, plant engineer of a large copper and brass producer in Chicago, says—"The Lincoln 'SAE' welder is one of the handiest pieces of equipment in our plant, and it has made possible a wider range of jobs at a considerably lower cost than with our former machine."

You too can expand your welding range and lower your costs with the *"Shield-Arc* SAE" welder. Equipped with Dual Continuous Control, this welder gives you fine adjustment of both the TYPE and SIZE of arc for a wider variety of work. On metals and alloys of all kinds and thicknesses you'll get better welds 15% to 20% faster.

Compare the "SAE" to the conventional welder for *first cost, welding efficiency, range* and *operating economy.* You'll find this *complete* welder gives more than 25% extra value for your welder dollar.

Mail the coupon for free booklets giving complete details and procedures.

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In fact, any sheet metal product that requires either spotwelding or punching.

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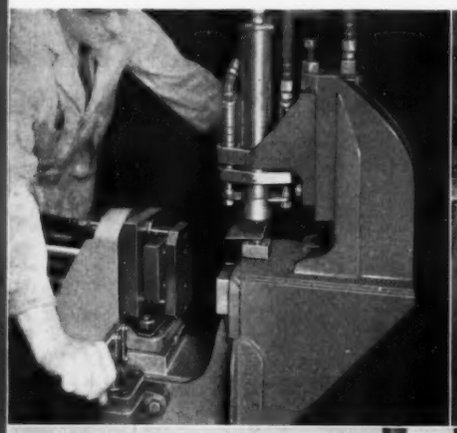
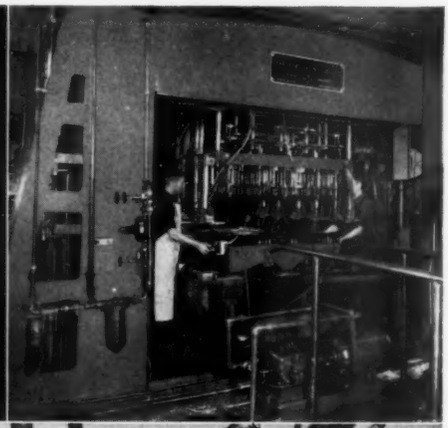
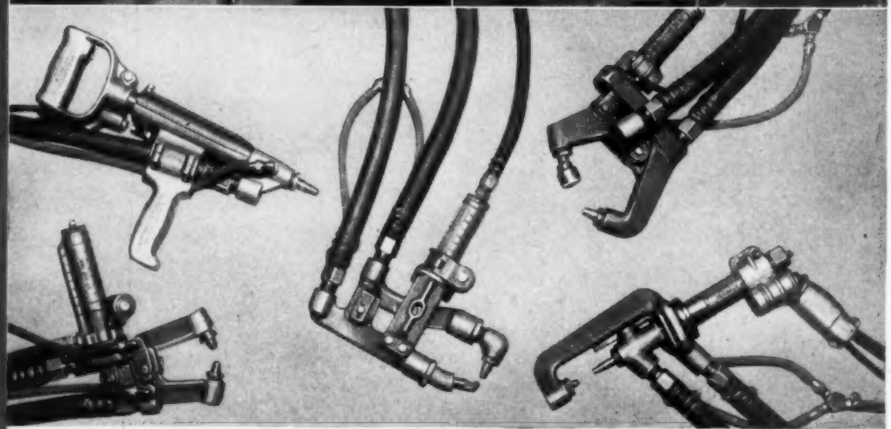
EVERY day, some of the country's largest manufacturers of automobiles and other sheet metal products are profiting through the use of efficient PROGRESSIVE equipment for many of their most difficult production jobs . . . PROGRESSIVE is an organization of practical production engineers ready and willing to help you on any spotwelding or punching problems you may have . . . Why not call or write for bulletins NOW?







UPPER LEFT
Hydraulic Punching Units

LOWER
Portable Hydraulic Welding Guns

UPPER RIGHT
Hydromatic Welders

PWC

PROGRESSIVE WELDER CO.
738 PIQUETTE AVE. • DETROIT, MICH.

In Welding . . . Progress with Progressive

Cleaning and Finishing

AUTOMATIC AND semi-automatic polishing and buffing units continue to find applications where production quantities justify. Regulation of indexing and work-rotating speeds to meet variations in requirements is possible in a line of automatic units having Geneva-rotated work tables. These tables are equipped with vertical work-holding spindles which are revolved by a chain drive. Two types of polishing spindles, both individually motor driven, can be positioned to polish or buff a portion of the work at each cross-slide that can be pivoted.

Tube and pipe polishing machines are equipped with a frustrum-shaped, leather-faced feed disk which can be adjusted to vary work feed from zero to 20 ft. per min. or more. Where more than one polishing operation is required on each piece, the units can be mounted in tandem on a common base.

Four new or improved metal spray guns were announced during the past year. These can be mounted for machine spraying or can be hand-held. One of these units features simultaneous valve control of both gas and air to insure proper sequence of control. Another has an arrangement by which the gun can be lit and the flames adjusted with or without feeding the wire. This eliminates wasting wire during the adjustment period. A gear shift permitting high speeds for spraying low melting-point metals and lower speeds for steel and similar materials, is featured on another metal spray gun.

Designed for high-speed, automatic finishing of small- and medium-size articles, an improved rotary paint-spray machine is said to be capable of finishing more than 3,600 small, light-weight articles per hour. Turntable of this machine will accommodate from 15 to 50 spindles, depending on the size of the parts being finished. Valve control is automatic on this unit.

Colors heretofore produced on metals by the anodic process and other chemical coloring methods, can be produced economically by a line of enamels recently announced. A brilliant transparent colored effect is claimed for these enamels. Paints that change color when exposed to heat are available for exterior or interior use. A series of permanent-change and retroactive-color paints is offered. Each of the changes is claimed to be sharp and easily recognized.

MEAKER ELECTRO-PLATING AND PROCESSING EQUIPMENT

MODERNIZE your plating methods with Meaker Automatics, designed *and built* by practical plating engineers to improve product, cut costs, up production. simplify handling, save floor space and—to meet your specific requirements, whatever they may be.

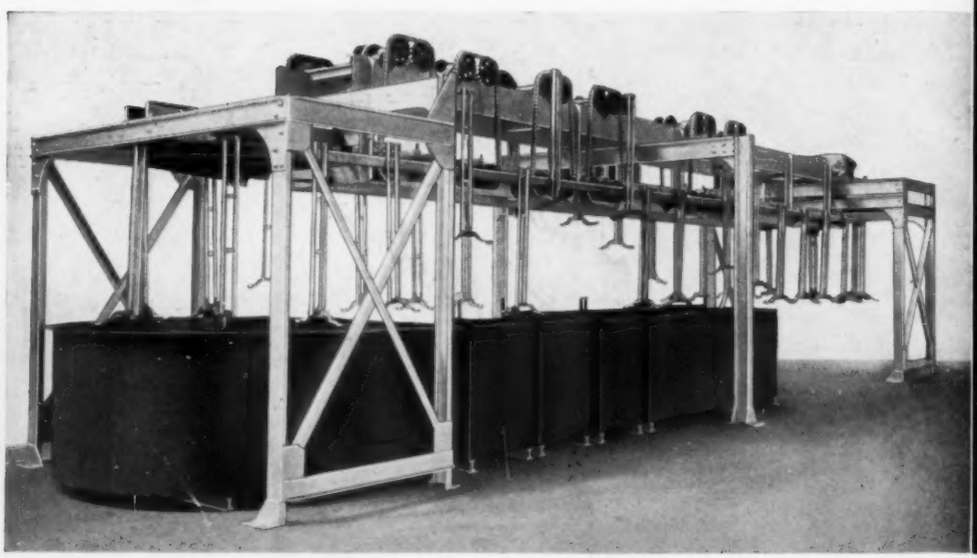
● These time- and money-saving "plus factors" are built into every piece of Meaker equipment: flexibility of transfer mechanism not approached by any other type—extremely high electrical efficiency—simplified timing control over a wide range—elimination of critical adjustments—safety factor of 10—space-saving design—lifetime construction.

● Let Meaker engineers study your plating, pickling, cleaning or special processing requirements. Their recommendations are backed by 38 years of experience in solving these problems for every type of industry.

THE MEAKER CO.

1629 So. 55th Avenue (Cicero Station)
Chicago, Illinois

Meaker Return Type Full Automatic Plating Machine



★

Full Automatic Plating Machines

Return Type
Straight-A-Way
Midget

★

Semi-Automatic Plating Machines

★

Automatic Equipment for:

Wire Cloth Galvanizing

Strip Steel Galvanizing

Pickling on the Line

Cleaning Wide Width Strip Steel

★

Meaker Self Sustaining Galvanizing Solution

★

Meaker-Electric Products Generators

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MEAKER PROCESS FOR ELECTRO GALVANIZING ROUND WIRE

Simplified, practical method for producing the extremely heavy, ductile, adhesive, uniform zinc coatings now demanded by critical wire buyers.

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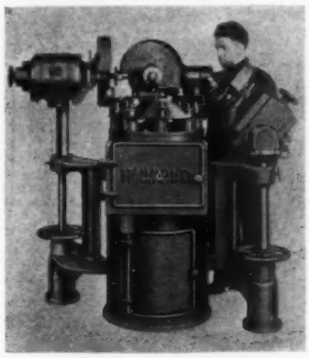
Polishing Machines and Supplies—Shotblast Equipment—Tumbling and Burnishing—Cleaning and Drying—Rust Preventatives—Plating Equipment and Supplies—Metal Spray Guns—Paint Spray Equipment—Paints, Lacquers, Enamels, Primers, Etc.

Polishing Machine, Type J

Hammond Machinery Builders, Inc., Kalamazoo, Mich. (Vol. 81,p. 996.)

A Geneva-rotated work table with eight revolving work spindles forms the work carrying section of the Type J rotary, automatic polishing and buffing machine. Revolving work spindles are connected by chain sprocket drives to a worm-gear reducing unit driven, in turn,

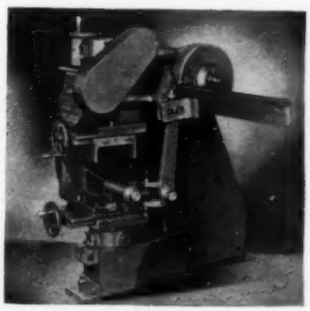


by V-belt from a motor in the base. Type JR polishing motors, left, are fitted with extended horizontal spindles and have vertical adjustment by handwheel. Type JRH motors, right, have threaded shafts.

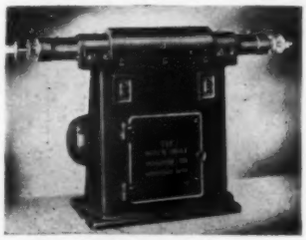
Polishing Machines, Type "T"

Acme Mfg. Co., 1645 Howard St., Detroit, Mich. (Vol.81,p. 385.)

These automatic tube and pipe polishing machines are completely ball bearing equipped, Type T unit is a single-wheel machine having a frustrum-shaped, leather-faced feed disk which can be adjusted



vertically for setting the speed of feed of the tube from 0 to 20 ft. per min. Floor space required is 50x50 in. The Type T-3 model consists of three polishing spindles equally spaced and adjustably mounted.



Polishing Stands

Hisey-Wolf Machine Co., Cincinnati, Ohio. (Vol.81,p.346.)

This line of buffing and polishing machines is arranged for external motor mounting and will accommodate any make or type of motor. Speed can be readily changed by changing the diameter of the motor V-belt sheave. Machines are available in sizes ranging from 3 to 25 hp.

Polishing Stands, No. 1

Packer Machine Co., Meriden, Conn. (Vol.81,p.427.)

No. 1 portable, vertical-type polishing and buffing stands are used in connection with polishing machines for

buffing inside surfaces of trays and similar products. An oval chuck, with capacity for pieces 21 in. on the long axis, is standard equipment.

Polishing Machine, Sheet

Mattison Machine Works, Rockford, Ill. (Vol.81,p.342.)

Designed for polishing stainless steel and other alloy sheets, the No. 453 wide-belt sheet grinder is arranged for the proper application of factory-coated abrasive belts that are claimed to provide a superior finish with even texture and economy. This grinder can be furnished in various widths and lengths. Unit

shown is designed to carry belts 50 in. wide and to grind sheets 48 in. wide by 14 ft. long.

Polishing Machine, No. 27-H

Excelsior Tool & Machine Co., Ridge Ave. & 32nd St., East St. Louis, Ill. (Vol.81,p.470.)

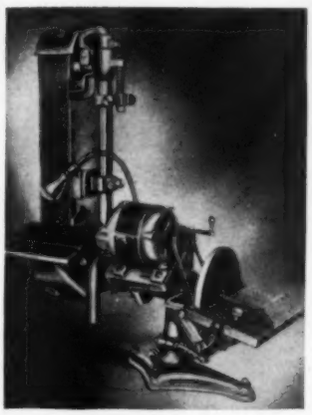
No. 27-H automatic sheet grinding and polishing machine, for finishing stainless

steel sheets, uses commercial abrasive paper in any width specified for 12 and 16 ft. endless belts. Design is heavy, for continuous production without vibration.

Surfacer, Universal

Walker-Turner Co., Plainfield, N. J. (Vol.81,p.226.)

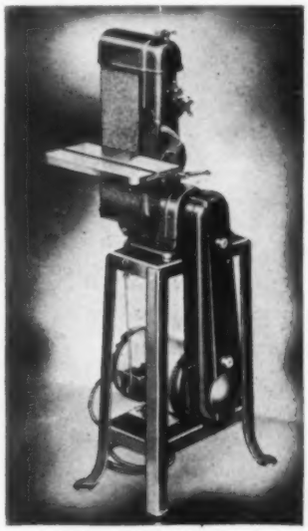
The "3-in-1" Universal belt-and-disk surfacer combines belt, disk and stroke surfacing in one machine. This unit is suitable for surfacing wood, metal, plastics, fiber, bone, cork and other materials.



Surfacer, 6-In.

Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee, Wis. (Vol. 81,p.262.)

This completely inclosed 6-in. belt surfacer is designed to handle a wide range of sanding, surfacing and finishing operations. It can be used either as a horizontal or vertical sanding machine.



Wheels, Polishing, Soft-Rubber

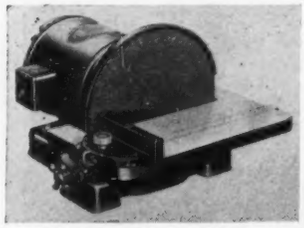
Chicago Wheel & Mfg. Co., 1101-1103 W. Monroe St., Chicago, Ill. (Vol.81,p.872.)

Polishing wheels made of a soft-rubber bonded abrasive material are intended for use where hard felt, leather, wood or hard canvas wheels have been used.

Sanders, Disk

Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee, Wis. (Vol.81, p.1168.)

Designed to fill the gap between light machines previously available and heavy, permanent-installation machines, two



disk sanders recently announced are suitable for use in the machine or the pattern shop. Model shown is a direct-driven type, with a base upon which may be mounted a ½- or ¾-hp. motor.

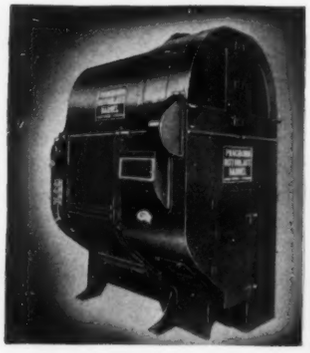
Adhesive, Polishing, "Flexogrip"

Udylite Co., 1651 E. Grand Blvd., Detroit, Mich. (Vol.81,p. 346.)

"Flexogrip" polishing-wheel adhesive is claimed to give a longer wheel "head" life, because it does not chip or break.

Blast Barrel, "Rocker Rotoblast"

Pangborn Corp., Hagerstown, Md. (Vol.81,p.584.)



The "Rotoblast Rocker Barrel" is a general-purpose blast barrel, designed for cleaning flat, mixed, long and fragile work. Barrel consists of the Rotoblast unit, a folding conveyor drum, the abrasive cleaning system and the control mechanism.

Buffing Compositions

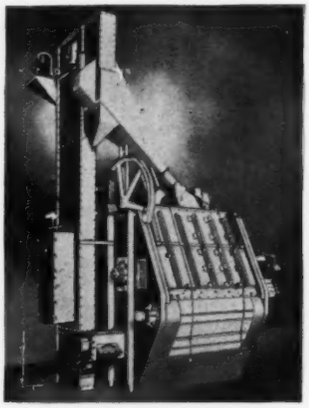
Bruce Products Corp., 5712 Twelfth St., Detroit, Mich. (Vol81,p.1240.)

An improved method has been developed for the preparation of these buffing compositions. This method mixes, shreds, vacuumizes or de-airs, cools and forms the bar in one continuous operation.

Blast Cleaner, "Tum-Blast," 48x48 in.

American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind. (Vol.81,p.588.)

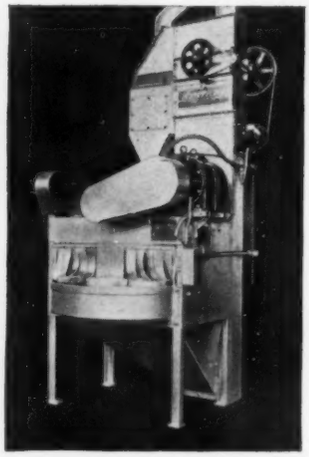
Larger than any equipment of this type previously offered, the 48x48-in. Wheelabrator "Tum-Blast" unit is designed primarily for heavy-duty service in cleaning reasonably compact castings and forgings weighing up to 300 lb. each. Unit has an operating load capacity of 20 cu.ft.



Blast Cleaner, "Tablast"

American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind. (Vol.81,p.1234.)

Tables for the small Wheelabrator "Tablast" cleaner can be furnished in sizes ranging from 5½ to 16 in. diameter. Any work under these size limits can be cleaned quickly. Unit consists of a number of independent tables which are mounted on a spider that carries them directly under the blast zone where they are rotated eight times to each foot of travel.



Compounds, Polishing, Pink-Lime

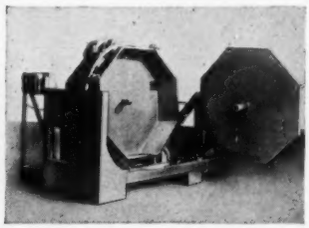
E. Reed Burns Mfg. Corp., 21-27 Jackson St., Brooklyn, N.Y. (Vol.81,p.589.)

Two grades of pink-lime polishing and buffing compounds, which are a combination of crocus and lime, have been developed especially for color buffing on brass or copper where the finished surface is to be later plated in a bright nickel solution.

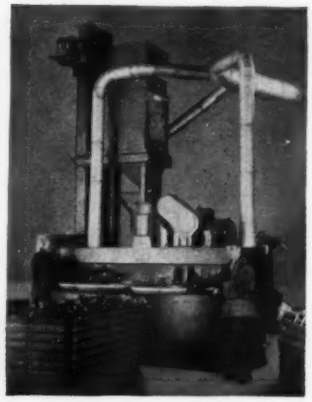
Barrel, Burnishing

N. Raansohoff, Inc., Cincinnati, Ohio. (Vol.81,p.870.)

This standard ball-return burnishing barrel has been adapted for burnishing the interiors of cast-aluminum change drawers for cash registers. Barrel is equipped with a 48-in. drum, into which a fixture is fitted for holding the drawers rigidly in place, spaced at regular intervals around the periphery.



Blast Table, "Rotoblast" Type "LG"



Pangborn Corp., Hagerstown, Md. (Vol.81,p,27.)

Type "LG" airless Rotoblast cleaning table has eight individual smaller tables which, as they approach the blasting zone, automatically start to revolve, thus presenting every exposed surface of the work placed upon them to the action of the blast.

Barrel, Cutting, "Triple-Action"

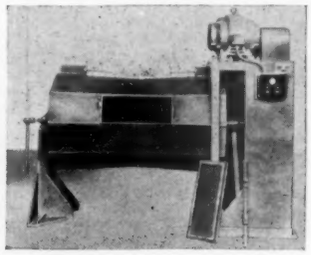
Hartford Steel Ball Co., Hartford, Conn. (Vol.81,p.755.)

The "Triple-Action" cutting barrel has been equipped with a built-in motor drive. This barrel is claimed to be suitable for cutting down, wet and dry grinding, tumbling, pulverizing and mixing operations.

Barrel, Burnishing

Belke Mfg. Co., 947 N. Cicero Ave., Chicago, Ill. (Vol.81,p. 586.)

This small-lot burnishing barrel is entirely self-contained. Cylinder is lined with hard rubber and is 6 in. wide by 10½ in. diameter across the flat sections. Work pan has perforated bottom and balls are quickly separated by shaking back and forth.



Barrel, Burnishing

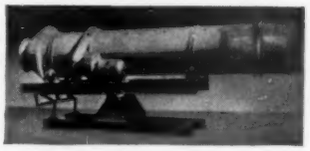
N. Ransohoff, Inc., Cincinnati, Ohio. (Vol.81,p.870.)

Designed for cleaning skate parts, this burnishing barrel has a three-section drum. Burnishing compartment is in the center, the other two sections being storage compartment for the burnishing ball.

Barrel, Tumbling, Model 4

Barber Tumbling Machine Works, Box 283 Oak Park Ill. (Vol.81,p.345.)

Equipped with a conical-shaped hopper and screens of two different mesh sizes, the Model 4 tumbling machine can be used to separate the tumbled product from all saw dust, scale and such pieces of scrap metal as will pass through the screen mesh while the load is being discherged.

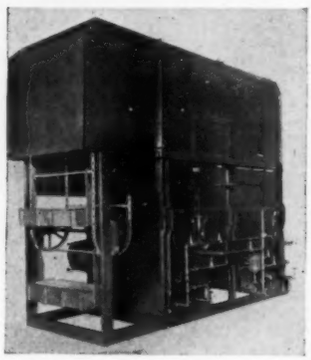


Degreaser, "Detrex," Automatic

Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich. (Vol.81,p.896.)

This automatic vapor-spray-vapor degreaser is equipped

with a two-strand, cross-rod type conveyor arranged for loading and unloading at the same end. Work is placed in perforated baskets which are hung from the cross-rods of the conveyor.



Drying Machine, Blast

Metalwash Machinery Co., Inc., 27 Haynes Ave., Newark, N. J. (Vol.81,p.424.)

Designed especially for drying tin-plated evaporator boxes, this cold and hot blast drying machine is suitable for spotless drying all types of plated parts. Parts, after plating, are rinsed in clear, cold water, and are then passed through the machine.

Rust-Preventives

Alox Corp., Buffalo Ave. & Iroquois St., Niagara Falls, N. Y. (Vol.81,p.895.)

Resulting from a process of oxidizing petroleum fractions under controlled procedure, the Alox line of rust-preventive compounds is available for dipping, spraying or brushing on metal surfaces to produce thin transparent, colorless and corrosion-resisting films. Series 701 compounds are recommended for use on ferrous metals and Series 702 for non-ferrous metals.

Cleaner, "Solvenite"

Leedan Products Co., 120 Liberty St., New York, N. Y. (Vol. 81,p.717.)

"Solvenite" is a granulated material that is claimed to have the ability efficiently to remove hardened grease, oils and wax from steel, iron and machinery parts. It cleans by emulsifying.

Cleaner, Metal, No. 78

Magnus Chemical Co., Garwood, N. J. (Vol.81,p.717.)

Magnus No. 78 emulsion is claimed to be suitable for cold-cleaning metal parts. Method combines solvent degreasing with soap washing. Grease, oil, paint and lacquer are quickly removed in this solution, which is safe for any metal.

Dryer, Centrifugal

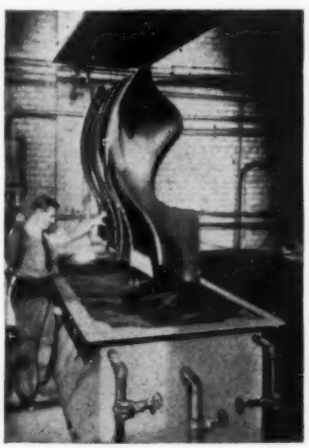
Tolhurst Centrifugal Div., American Machine & Metals, Inc., 100 Sixth Avenue, New York, N. Y. (Vol.81,p.425.)

Metal parts are dried by means of centrifugal force and hot air which is forced through and around the parts. Pieces to be dried are placed in a perforated basket which is placed in the centrifugal and rotated at high speed. Four sizes are available, with diameter of baskets ranging from 12 to 26 in. Basket capacity ranges from 0.14 to 1.3 cu.ft.

Bonderizing, "Dip-Spra"

Parker Rust-Proof Co., 2177 E. Milwaukee Ave., Detroit, Mich. (Vol.81,p.225.)

"Dip-Spra Bonderizing" process is a method of applying a corrosion-resistant coating adapted to the needs of production departments whose requirements do not justify installation of conveyor equipment. A formula has been developed whereby the process will produce a corrision-inhibiting coating on galvanized, zinc alloy and cadmium surfaces, as well as on iron and steel.



Bonding Process, "Marks Bond"

Bonding Process Corp., 10401 Northlawn Ave., Detroit, Mich. (Vol.81,p.675.)

"Marks Bond," a bonding process to provide protection for metal parts against corrosion, has considerable latitude in application. Surface produced is smoothly etched and forms a good base for paint or enamel where an even, lustrous finish is required.

Rust Preventive, "Ne-Ver-Rust"

Never Rust Mfg. Co., 1771 E. 18th St., Brooklyn, N. Y. (Vol. 81.p,427.)

"Ne-Ver-Rust" rust preventive, when applied to metal surfaces, leaves a film coating and is claimed to make the metal imprevious to dampness.

Barrel, Oxidizing

Plating Products Co., 32 Mulberry St., Newark, N. J. (Vol. 81,p.672.)

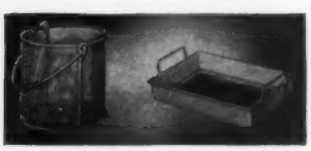
This portable oxidizing barrel for handling small parts can be used with almost any

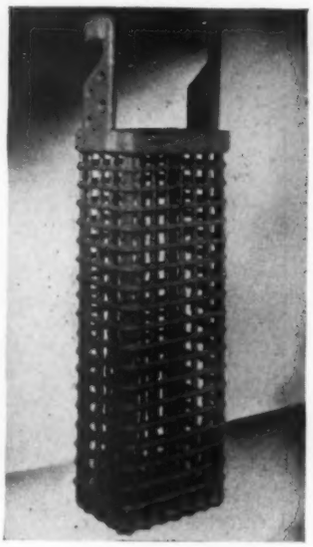
of the well-known processes of rust-proofing or black finishing by immersion.

Baskets and Trays, Plating

Udylite Co., 1651 E. Grand Blvd., Detroit, Mich. (Vol.81, p.343.)

A complete line of all-welded dipping baskets and trays for plating use is now available. It is claimed that construction of these units permits carrying heavy loads without bulging.





Anode, "Scrap Saver"

Collord, Inc., 7048 Lyndon Ave., Detroit, Mich. (Vol.81,p. 424.)

Scrap anodes in the plating room may be used up with the "Scrap Saver." Basket is heavily insulated with a semi-hard rubber and is designed to carry heavy loads. Method of use is to hang the unit on the bus-bar with a good anode in the center surrounded by the scrap.

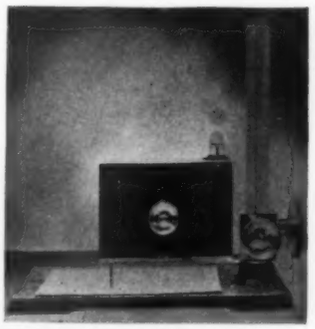
Gum, Synthetic, Insulating, "Zetyl"

Nelson J. Quinn Co., 417-13th St., Toledo, Ohio. (Vol.81,p. 594.)

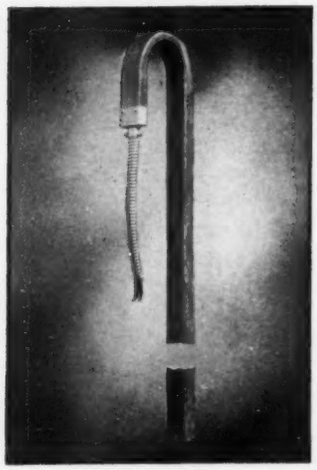
"Zetyl" is a synthetic gum in liquid form for insulating plating racks. It is used cold and applied with brush, spray gun or by dipping. Claimed to withstand action of all acids and alkalies except hot, concentrated nitric acid.

Tester, Thickness, "Nickel Coating"

American Instrument Co., 8010-8020 Georgia Ave., Silver Spring, Md. (Vol.81,p.757.)



Local thickness of an electroplated nickel-coating on a non-magnetic base metal may be determined with this instrument, which measures the force required to detach one pole of a magnet from the coating.



Heater, Immersion, Plating-Tank

Harold E. Trent Co., 618 N. 54th St., Philadelphia, Pa. (Vol.81,p.634.)

This electric immersion heater for plating tanks has casing made of copper, steel or other alloys which are lead coated when required for nickel plating, chromium plating, acid copper and acid zinc baths. Unit shown has an overall length of 46 in. and is rated at 3 kw., 330 volts.

Enamel, Insulating, Plating-Rack

Maas & Waldstein, 438 Riverside Ave., Newark, N. J. (Vol. 81,p.1236.)

Developed for insulating all but the contact points of racks used in chrome plating, this chrome rack enamel is supplied in two colors, red and black. It is applied by dipping the racks, with the contact points protected by tape, into the enamel. Three or four coats are required.

Electrometer, pH

Coleman Electric Co., 310 Madison St., Maywood, Ill. (Vol.81, p.712.)

Designed both for the determination of pH with the glass electrode and for the measurement of oxidation-reduction potentials, the Model 3-D pH

electrometer is fully portable and is claimed to be accurate within 0.05 pH. Temperature compensation is automatic.

Solution, Plating, Nickel, "Varzite"

Munning & Munning, Inc. 202-208 Emmett St., Newark, N.J. (Vol.81,p.385.)

"Varzite" is a general-purpose nickel-plating solution claimed to have superior throwing power. Unlike other forms of nickel plating baths which are acid, "Varzite" operates on the alkaline side.

Meter, pH, Portable

Thwing-Albert Instrument Co., 3339-41 Lancaster Ave., Philadelphia, Pa. (Vol.81,p.387.)

This meter is of interest primarily to the electroplating industry, being essentially an indicator of the active acidity or alkalinity of a solution. Model No. 1 is for general use and is furnished with electrodes for either acid or alkaline determination. Model 2 is an all-purpose vacuum-tube type.

Rubber Compound, Insulator, "Selfvulc"

Self-Vulcanizing Rubber Co., 605 W. Washington Blvd., Chicago, Ill. (Vol.81,p.387.)

"Selfvulc" insulator is a combination of Type M Primer and liquid rubber selfvulc. It can be applied either by dipping, spraying or brushing.

Gun, Spray, Metal, "Mogul," Metallizer

Metallizing Co. of America, Inc., 1351 E. 17th St., Los Angeles, Calif. (Vol.81,p.341.)

The "Mogul" metallizer gun

is designed for use with No. 11 B&S gage wire or $\frac{1}{8}$ in. diameter rods or wire. Gun uses simultaneous valve control in which the gases and air are turned on and off in proper sequence.

Gun, "Metalspray"

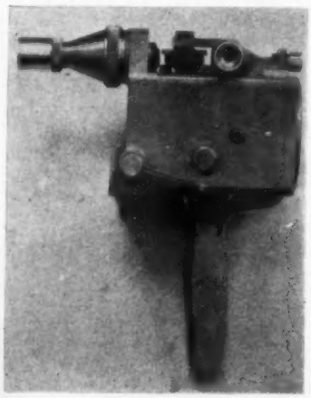
Metalspray Co., Inc., 113 Llewellyn St., Los Angeles, Calif. (Vo.81,p.384.)

"Universal" Metalspray gun with capacity for all metals in wire and rod form from $\frac{1}{8}$ in. diameter to No. 20 B & S gage. Combustion unit has capacity to melt metals having a melting point ranging from 400 to 4,800 F. Power unit is completely separated from the combustion unit.

Gun, Spray, Metal, "Majestic" MetaLayeR

Metals Coating Co. of America, 495 N. Third St., Philadelphia, Pa. (Vol.81,p.1050.)

Available with a standard handle for manual operation, or with an adjustable toolpost holder for mechanical operation, the "Majestic" MetaLayeR



gun will handle wires ranging from No. 20 B&S gage to $\frac{1}{4}$-in. diameter.

Gun, Spray, Metal, Model OZ-3

Stevens Metal Spraying, Inc., 83 Shipley St., San Francisco, Calif. (Vol.81,p.1237.)

A gear shift is an integral part of the assembly of the

Model OZ-3 metal spray gun. High speeds are available for spraying the lower melting-point metals, such as tin, lead, cadmium and zinc. Low speeds are suitable for spraying aluminum, brass, copper, bronze and various grades of steel, using $\frac{1}{4}$ in. diameter wire.

Gun, Spray, Paint, No. 14-B

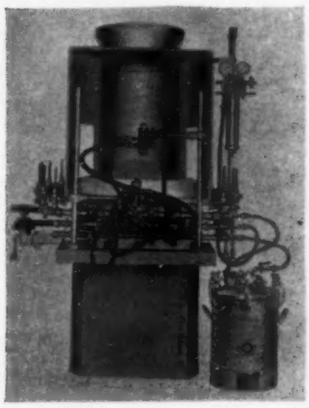
Spray Engineering Co., Central St., Somerville, Mass. (Vol.81, p.428.)

Changes in design and construction of the No. 14-B spray gun include nozzle parts and inner connections of stainless steel and an improved air-valve construction. All fittings are chromium plated.

Gage, Paint-Mixing

Binks Mfg. Co., 3114-26 Carroll Ave., Chicago, Ill. (Vol.81,p. 426.)

These hydrostatic gages are calibrated for paint mixing and pressure tanks and permit control of uniformity and viscosity by "weight" mixing. A clear vision gage shows the exact weight of lacquer and thinner.



Finishing Machine, Paint Spray, Type YB

DeVilbiss Co., Toledo, Ohio. (Vol.81,p.1164.)

Type YB improved, rotary spray-finishing machine is designed for high-speed, automatic finishing of small- and medium-size articles. It is claimed that this machine is capable of exceeding 3,600 finished, small, light-weight articles per hour. It is equipped with spindles, automatic spray gun, automatic control valve, hose connections and other accessories. Turntable will accommodate 15, 20, 23, 30, 40 and 50 spindles.

Head, Spray Gun, "Hollow Air"

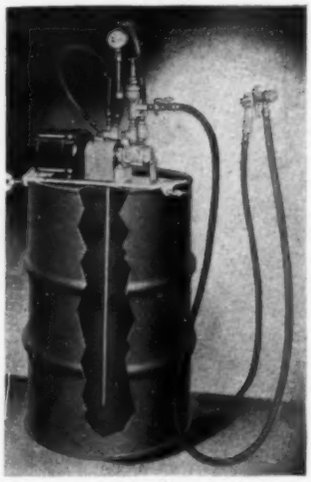
The Alexander Milburn Co., 1416 W. Baltimore St., Baltimore, Md. (Vol.81,p.1292.)

The "Hollow Air" atomizer head or air cap for paint spray guns is claimed to smoothly atomize synthetic enamels, paints and lacquers. Working with the gun at a normal distance of 6 to 10 in. from the work, satisfactory spray widths of 18 in. or more are said to be obtained.

Pump, Fluid, Type QB

DeVilbiss Co., Toledo, Ohio. (Vol.81,p.339.)

Clear varnish, clear lacquer and other non-pigmented finishing material is delivered from the shipping container direct to the spray gun by the Type QB fluid circulating pump. This pump generates sufficient pressure in the pump head to feed fluid to the spray gun at a correct, predetermined pressure.



Enamel, Dielectric, Black

Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J. (Vol.81,p.868.)

This black enamel, claimed to be especially suitable for finishing electrical apparatus, such as steel switchboards and instrument panels, dries to a rubber finish and is claimed to be tough, durable and to have high electrical resistance.

Enamels, Colored, "Platelustre"

Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J. (Vol.81,p.146.)

Colors, heretofore produced on metals by the anodic process and other chemical coloring methods, can be produced economically by a line of enamels marketed under the trade name "Platelustre."

Finish, Wrinkle, Rubalt No. 133

Hague & Co., Inc., 233-37th St., Brooklyn, N. Y. (Vol.81,p.387.)

Rubalt No. 133 rubber-base wrinkle finish is claimed to have good chemical resistance. It is available in various colors, also in dyed bronzes. No under coat is required.

Finishes, Industrial, F. W. B.

Everseal Mfg. Co., Fisk Bldg., Broadway and 57th St., New York, N. Y. (Vol.81,p.713.)

These "F.W.B.-Everseal" finishes are fortified with Bakelite resins for resistance to moisture and weathering. They include heat-resistant aluminum finishes, metal trim enamels, machinery enamels, heat-resistant enamels, spar varnishes and alcohol-resistant varnishes.

Finish, Flexible, "Duflex"

Maas & Walstein, 438 Riverside Ave., Newark, N. J. (Vol.81,p. 225.)

"Duflex," a flexible lacquer finish for high-grade metal products subjected to extremely hard usage, is claimed to closely resemble the finish produced by extruding or cementing celluloid upon a metal base.

Finishes, Synthetic, Metal

Roxalin Flexible Lacquer Co., Elizabeth, N. J. (Vol.81,p.186.)

Improvements in synthetic metal finishes result from the development of a new rubber-base raw material. One of the new products is a non-silking, drierless, roller coating material that is clean and free from nibs of oxidized or polymerized particles. It has good adhesion on all metals.

Lacquer, Baking, "Durtemp"

Maas & Walstein Co., 438 Riverside Ave., Newark, N. J. (Vol.81,p.717.)

"Durtemp", a heat- and chemical-resistant baking lacquer is claimed to withstand the action of match flames, alcohol, household chemicals.

Lacquer, Bronze, For Rubber

Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J. (Vol.81,p.1286.)

Designed to give rubber parts or products a metallic finish that will harmonize with the metals with which they will be used, this special bronze lacquer consists of a bronzing liquid to which metal powder of any kind is added just prior to use.

Lacquer, Clear, Perspiration-Proof

Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J. (Vol.81,p.1295.)

This lacquer is applied by dipping or spraying and air-dries out of dust rapidly. After hardening for a few days, it becomes practically insoluble and resistant to moisture, soap, water, including perspiration.

Paint, "Heat Indicating"

Efkalin Co., 80½ E. 111st St., New York, N. Y. (Vol.81,p.28.)

Paints that change color when exposed to heat are available for exterior or interior use. Good for twelve months protection. A series of five permanent-change and seven retroactive-color paints are available.

Lacquers, Air-Drying, "Durheat"

Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J. (Vol.81,p.594.)

"Durheat" lacquers have been designed for finishing electrical equipment and other products normally subjected to elevated temperatures.

Paint-Compound, "Wet-X-Hale"

"Wet-X-Hale" Paint-Compound Co., 572 Greenwich St., New York, N. Y. (Vol.81,p.266.)

"Wet-X-Hale" is a compound which, when mixed with paints, lacquers and varnishes, can be safely applied directly on damp, moist and wet-from-rain surfaces.

Primer, Clear, "Chroprime"

Maas & Waldstein Co., 420 Lexington Ave., New York, N. Y. (Vol.81,p.185.)

"Chroprime" is a clear primer which can be applied to a chromium surface.

Primer, "Speed"

Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J. (Vol.81,p.1061.)

This synthetic "Speed" primer is suitable for use under air-drying lacquer-enamels.

Rubber, Brushing, "Surfaseal"

Collord, Inc., 7048 Lyndon Ave., Detroit, Mich. (Vol.81, p.428.)

"Surfaseal," a liquid rubber which can be brushed on surfaces for their protection, is available in two types and in black, gray, or brick-red colors.

Protection, Finish, "Tem-Pro-Kote"

Collord, Inc., 7048 Lyndon Ave., Detroit, Mich. (Vol.81,p. 425.)

"Tem-Pro-Kote" system of protecting metal finishes during manufacture, transit or storage, consists of the application of paper, by means of a special adhesive.

Primer, Air-Drying, Spot-Welding,

Sherwin-Williams Co., 101 Prospect Ave., N. W., Cleveland, Ohio. (Vol.81,p.346.)

This air-drying, spot welding black primer was developed primarily for automotive production manufacturers. Listed as Primer No. X9185, it dries to the touch in 10 or 15 min.

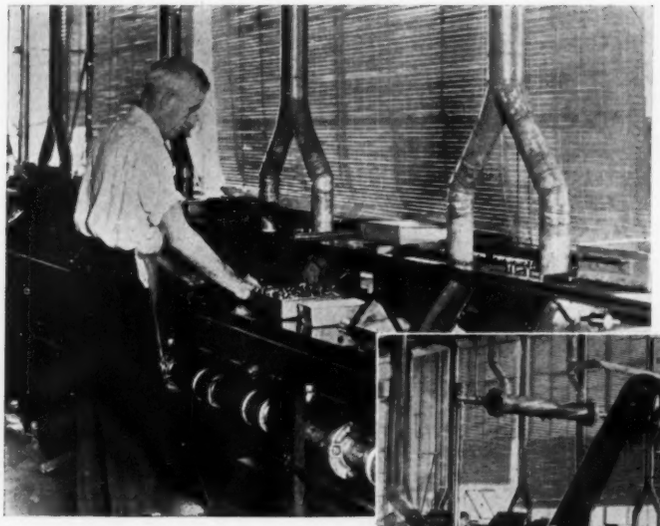
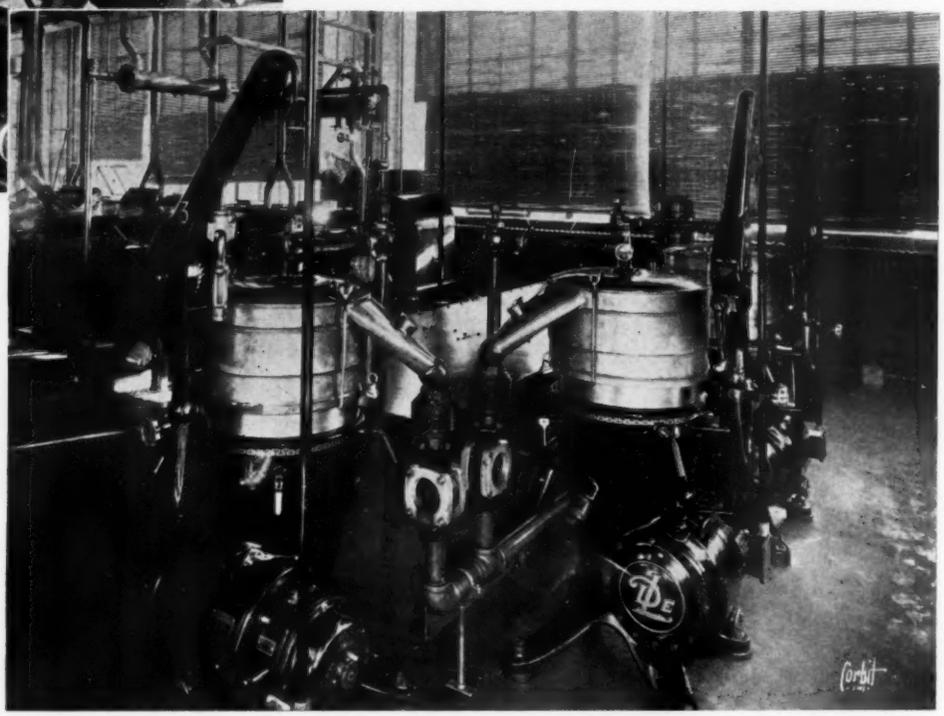


ILLUSTRATION at the left shows bearing washing operation at the Norma-Hoffmann Bearings Corporation, Stamford, Conn., where continuously purified oil "cleans the bearings, instead of washing dirt into them." Below is shown three high-capacity De Laval Oil Purifiers which make it much more economical to use clean oil than to take a chance with that containing impurities.



Norma-Hoffmann has found it pays to wash bearings in clean oil

Washing bearings or other parts with really clean and dry oil not only improves the product in several ways but is most economical as well. For with De Laval Purifiers the oil is so completely cleansed after each passage over the work that it can be kept in service indefinitely—*at full efficiency.*

De Laval Centrifugal Purifiers and Clarifiers have been specified for many years by production executives who realize that liquids such as bearing washing oil cannot serve their purpose well while carrying quantities of foreign material. De Laval machines operating at constant high efficiency provide the most positive and for that reason the most economical means of removing such injurious material.

Write for full information on this and other economies effected by De Laval centrifugal machines in modern metal working plants.

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 427 Randolph St., Chicago
DE LAVAL PACIFIC COMPANY, 61 Beale St., San Francisco
THE DE LAVAL COMPANY, LIMITED, Peterborough, Ont.

DE LAVAL CENTRIFUGAL SYSTEMS
FOR OIL PURIFICATION AND RECLAMATION

The HARTFORD
TRIPLE-ACTION CUTTING BARREL

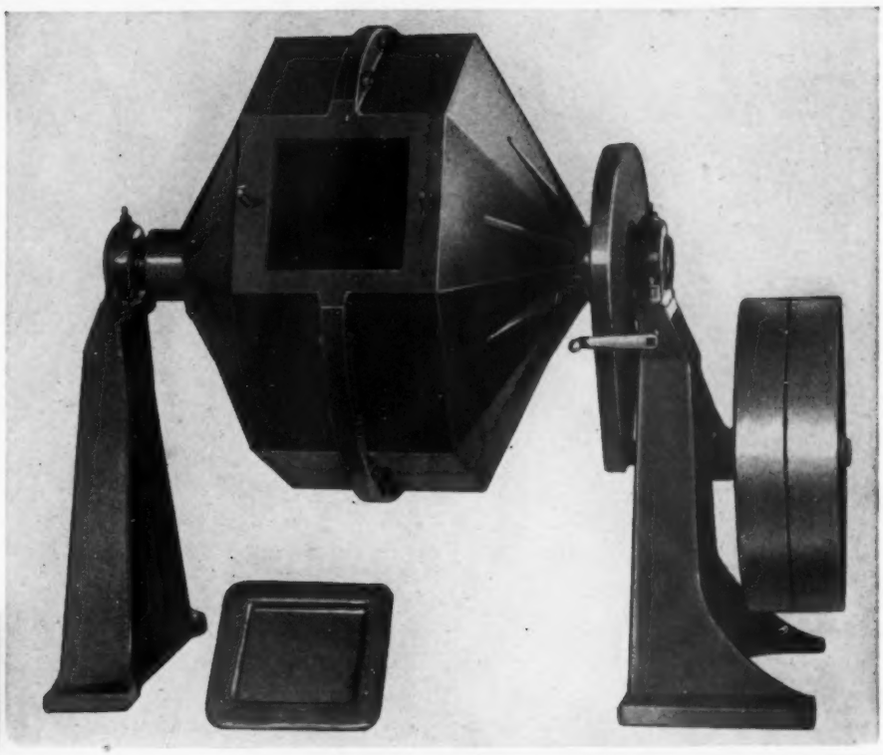
for more and better finishing at vastly reduced costs

Many jobs done by hand can be performed by the Hartford Cutting Barrel at outstanding savings in time and expense.

On wet grinding, for example, using sand and water, the speed and Triple Action of the Hartford Cutting Barrel does a quick, thorough job at remarkably low cost. In one plant, running time was cut over the previous method from 8 hours to 1 hour—and far better work produced.

The multiple action of the Hartford, achieved by the unique shape of the barrel, produces a fine smooth finish on all kinds of grinding and tumbling operations. It also reduces the cost of mixing, pulverizing and cutting down.

Write for Illustrated Descriptive Bulletin, giving complete details of these machines which are available in belt driven and in-built motor driven types.



The
HARTFORD STEEL BALL CO.
HARTFORD CONN.

BARRETT CENTRIFUGAL DRYERS

This centrifugal has been designed for the efficient drying of small objects made of pressed metal and wire . . . increased effectiveness is obtained through the use of special fan and heat arrangements which control the air flow through the work and absorb the moisture quickly. *Speeds production —cuts costs.* Write TODAY for complete information.

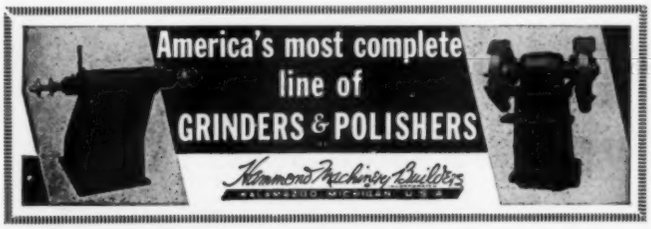
The
LEON J. BARRETT CO.
1800 GRAFTON ROAD
WORCESTER, MASS.

CENTRIFUGAL MACHINERY MANUFACTURERS

SIMPLEX-M Abrasive Band Grinder

This Grinder accelerates production and cuts costs. The use of this new modern machine assures straight grain finishes with sharp edges. *Details of this and other styles and sizes on request.*

WALLS SALES CORP.
96 Warren Street, NEW YORK



WATERBURY Steel Balls are made of high carbon chrome alloy steel which assures uniform hardness to the very center of each ball.

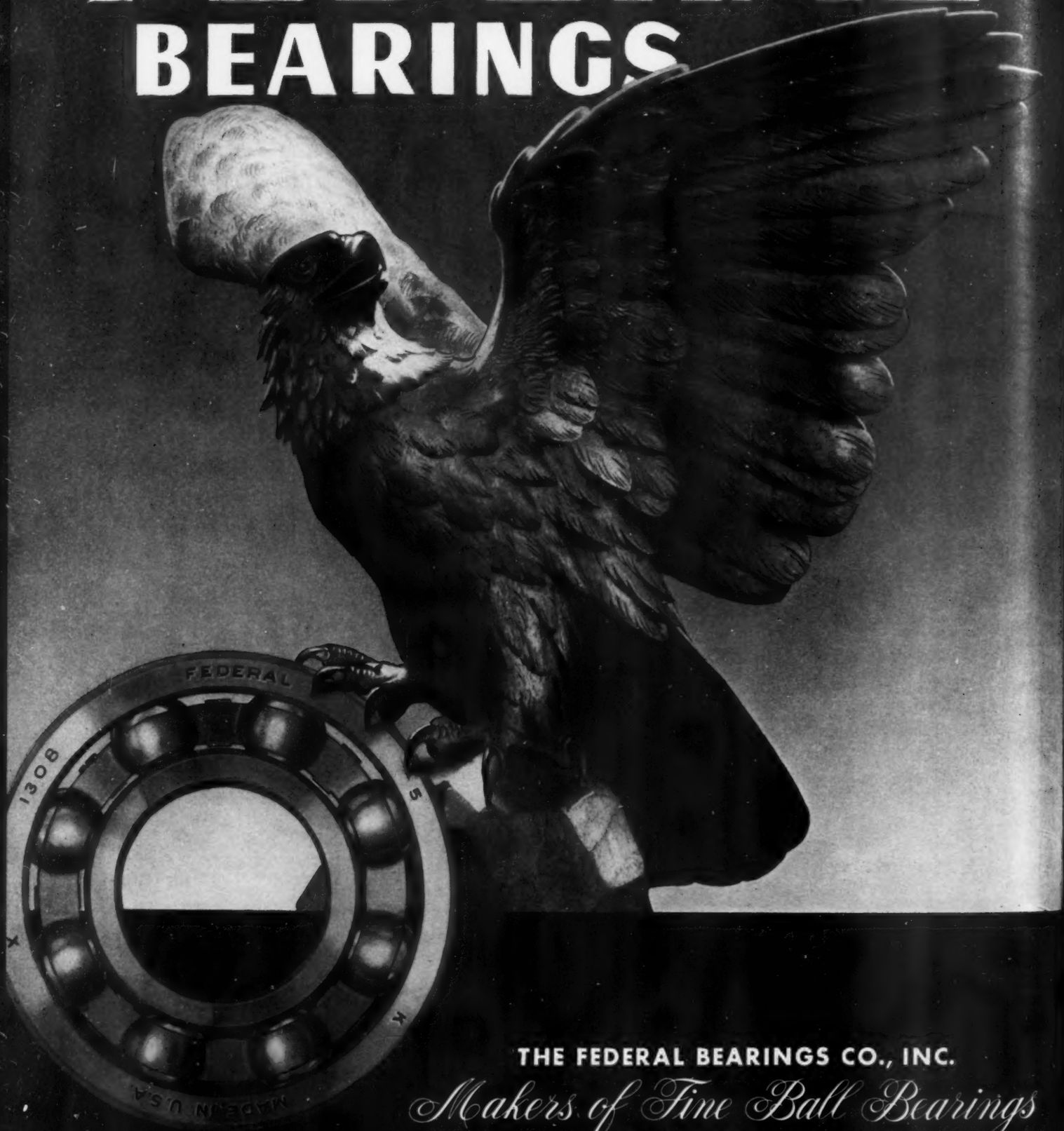
Surface highly finished. No imperfections. Exceptionally accurate. Waterbury Steel Balls are built for manufacturers who seek quality, rather than price.

HIGH CARBON CHROME ALLOY STEEL, BRONZE, MONEL METAL, STAINLESS STEEL BALLS. STANDARD OR SPECIAL SIZES. WRITE FOR COMPLETE INFORMATION.

THE WATERBURY STEEL BALL CO., INC.
Poughkeepsie, New York
Factory: Waterbury, Conn.

WATERBURY STEEL BALLS

FEDERAL BEARINGS



THE FEDERAL BEARINGS CO., INC.

Makers of Fine Ball Bearings

POUGHKEEPSIE, N. Y.

Detroit Sales Office: 2608 Book Tower • Chicago Sales Office: 120 N. Peoria St.
Cleveland Sales Office: 402 Swetland Building

Parts and Materials

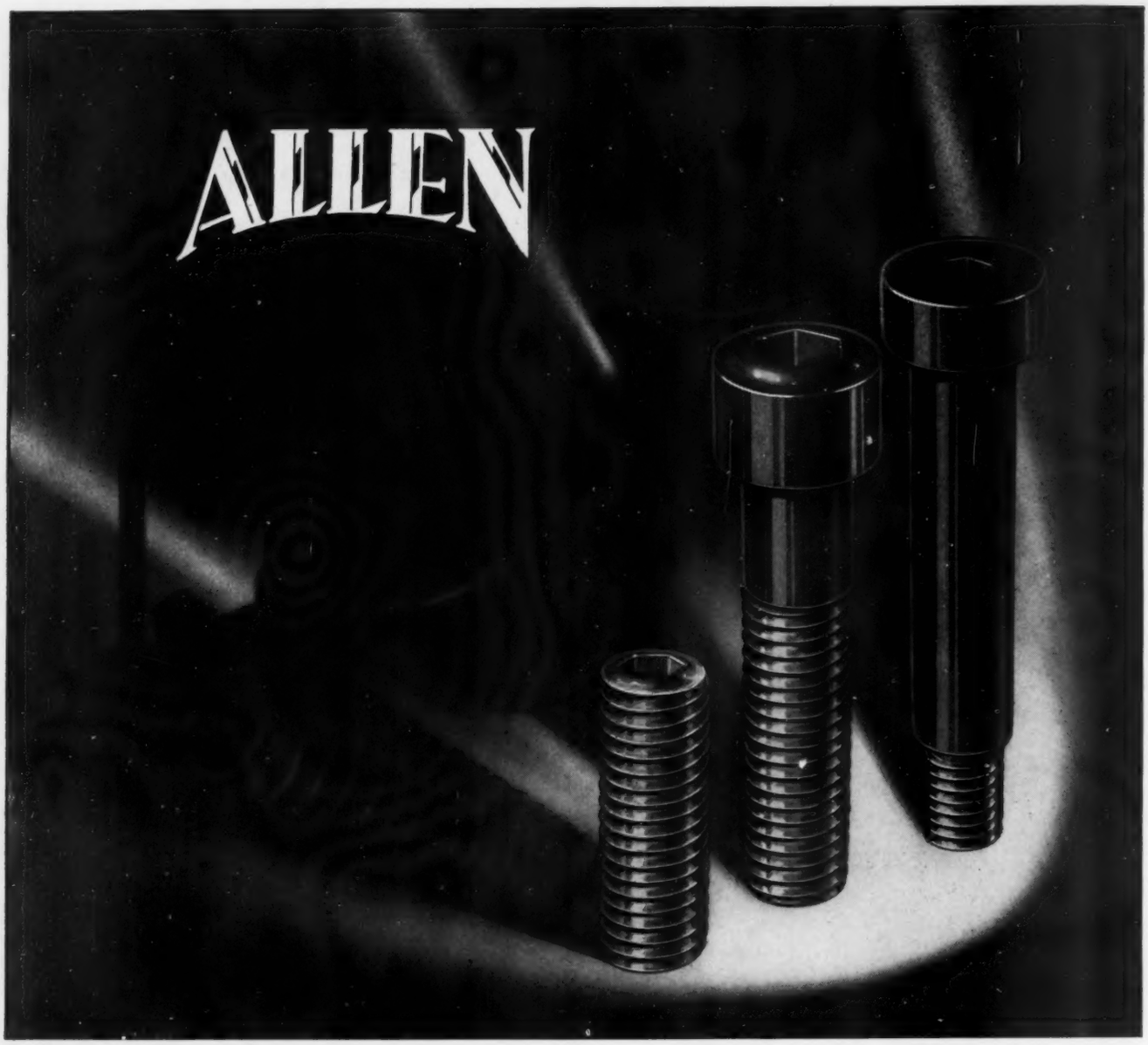
A LOW-ALLOY, high-strength steel announced in 1937 is said to possess strength appreciably in excess or ordinary structural steel. Good hot and cold working properties, little tendency to harden and rapid cooling and high resistance to atmospheric corrosion are also claimed for this material.

This steel cannot be formed and drawn as drastically as a dead-spot steel, but otherwise no serious difficulties are encountered in fabrication. It can be welded readily by any of the various processes. Steel of this classification has a minimum yield point of 50,000 lb. per sq.in. and a minimum tensile strength of 65,000 lb. per sq.in.

A number of new plastic molding materials, typifying the rapid development of this field, were offered during the year. Several of these materials have high impact-resistance, making them particularly suitable for industrial applications. Another plastic material, recently developed, is sprayable and is claimed to have high corrosion-resistant properties. This material is claimed to bond to the base material, whether it be concrete, steel or wood.

Improved corrosion and wear resistant materials are being employed in the construction of hydraulic and other valves, a number of which were improved during the year. One new line of hydraulic valves, suitable for use with pressures up to 2,000 lb. per sq.in., incorporates the same no metal-to-metal wear principles as used in similar pneumatic valves.

Metal marking colors, which may be applied by rubber stamping or by stenciling, are offered for marking part numbers, alloy numbers, name, date, or other identifying information on all types of metal surfaces. These colors are said to give a clear and distinct impression. Knurling the two top threads of a new line of setscrews is said to make them selflocking.



Before You Blueprint

"ALLENS" are no longer accessory details in machine design, left to the last. They influence design from the first. They make possible more compact constructions. They aid in attaining flush surfaces, unbroken contours, narrower flanges, tighter joints. They make streamlining practical. They are readily kept within reach of the wrench in pockets, walled corners, all close quarters.

The properties of the Allen product have worked in hand with the modern trend, in removing obstructions to speedy assembling and trouble-free operating. They have met the needs of machine construction in utilizing ever-stronger alloy steels. They have initiated the use of smaller-size screws than formerly were required, reducing the requisite size and weight of the parts in which screws are used.

SAMPLES — *free* — to your specifications

THE ALLEN MFG. COMPANY *HARTFORD, CONN. U. S. A.*

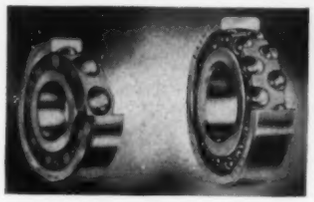
Sole European Distributors: **S. RALPH GOLDING & CO.,** ★ 13 MALLOW STREET, OLD STREET ★ LONDON, E. C. 1.

Ball and Roller Bearings—Materials—Valves and Fittings—Miscellaneous

Bearings, Ball, Heavy-Duty

Fafnir Bearing Co., New Britain, Conn. (Vol.81,p.340:)

A series of high-capacity ball bearings, designed to meet the severe problems of shock loads, vibration and wear coincident with the operation of heavy-duty machinery, is available.



being carried entirely on the oil film. These bearings are interchangeable in size with existing types of ball and rolled bearings.

Bearings, Ball, Precision, Type X

Fafnir Bearing Co., New Britain, Conn. (Vol.81,p.386.)

Built primarily for use in high-speed grinding equipment where shaft speeds range from 5,000 to 40,000 r.p.m. and higher, Type X extreme-precision duplex ball bearings are pre-loaded.

Bearings, Ball, Self-Aligning

Fafnir Bearing Co., New Britain, Conn. (Vol.81,p.1110.)

Three types of self-aligning ball bearings, available in a full range of sizes, are offered. In the Type B bearing, the conventional outer ring is made with a spherical instead of cylindrical outside surface. The Type S bearing permits the conventional cylindrical surface of the housing to be retained. Self-alignment entirely from within the outer bearing ring is provided in the Type D bearing.

Bearing, Precision, Oil-Film

Fast Bearing Co., Hampden Ave. and 23rd St., Baltimore, Md. (Vol.81,p.590.)

Each of these bearings functions as a self-contained pump, creating a centrifugal force feed lubrication system. There is no metallic contact, the load

Steel, Low-Alloy, Mayari R

Bethlehem Steel Co., Bethlehem, Pa. (Vol.81,p.862.)

A low-alloy, high-strength structural steel, Mayari R is claimed to possess strength appreciably in excess of ordinary structural steel, good hot and cold working properties, good welding characteristics, little tendency to harden on rapid cooling, and great resistance to atmospheric corrosion.

Steel, High Carbon, "Speed Treat X-1545"

Monarch Steel Co., Indianapolis, Ind. (Vol.81,p.671.)

"Speed Treat X-1545" is a 0.40- to 0.50-carbon, open-hearth, free-machining steel having a tensile strength of 110,000 lb. It is claimed that this steel approaches SAE 1112 Bessemer in free-machining, carrying a rating of 90 per cent. It has good case-hardening properties.

Monel, "Ebonized"

International Nickel Co., 67 Wall St., New York, N. Y. (Vol.81,p,1176.)

Ebonized Monel, identical with standard Monel except that a lustrous "blue-black" finish is imparted by oxidizing, is available for applications where appearance must be maintained under temperatures up to 1,400 F.

Alloy, "Hastelloy B"

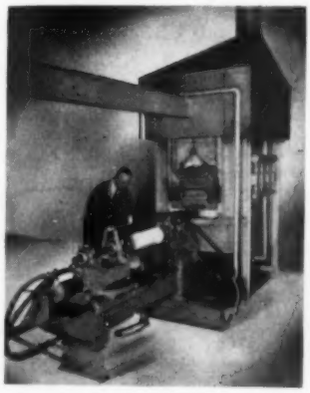
Haynes Stellite Co., 30 E. 42nd St., New York, N. Y. (Vol.81,p. 585.)

"Hastelloy B" has been produced primarily for service in equipment handling hydrochloric acid, and is claimed to stand up well in sulphuric and phosphoric acids, acetic and other organic acids, and in non-oxidizing acid chloride solutions. Tensile strength in the forged, rolled and fully annealed state is about 135,000 to 140,000 lb. per sq.in.

Alloy, Hard-Facing, "Xaloy"

Wilcox-Rich Div., Eaton Mfg. Co., Detroit, Mich. (Vol.81, p.258.)

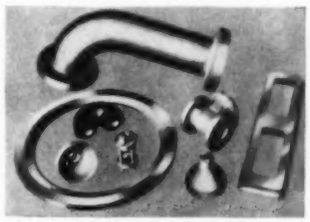
"Xaloy", a hard-facing alloy, is suitable for applications where its high-hardness and resistance to abrasion can be used to advantage and where high impact values and ductility are not important. It has a tensile strength of 43,000 lb. per sq.in., and compression strength of 240,000 lb. per sq.in. Its hardness is equivalent to 750 Brinell or 68 to 70 Rockwell C. A method of centrifugal casting has been perfected wherein "Xaloy" is applied in a molten state to the outside or inside diameter of tubular pieces.



Castings, Silchrome, Stainless Steel

Ludlum Steel Co., Buffalo Foundry Div., Buffalo, N. Y. (Vol.81,p.182.)

Silchrome stainless- and heat-resisting steel castings made from steel prepared in the hollow-electrode furnace are claimed to be unusually free from porosity and to possess excellent corrosion rensistance. The steels react favorably to heat-treatment.



Paste, "Sweat-On"

Colmonoy, Inc., P.O. Box 977, Los Mietos, Calif. (Vol.81,p. 386.)

A process and material for producing a wear-, heat- and corrosion-resistant overlay or hard facing. It is in the form

of a paste which is spread over the surface to be processed. The paste is sweated into the surface with the flame of a torch, a carbon arc or by furnace heat.

Sheet, Galvanized, "Zincgrip"

American Rolling Mill Co., Middletown, Ohio. (Vol.81, p.1061.)

Produced in both sheets and coils, Armco "Zincgrip" sheets are claimed to have a heavy coating of commercially pure zinc that will not crack or peel when it is subjected to relatively severe drawing or forming operations. Pans have been successfully drawn to a depth of 5 in. without injuring the coating.

Die Castings, Magnesium

Doehler Die Casting Co., 386 Fourth Ave., New York, N. Y. (Vol.81,p.806.)

Three magnesium alloys, having a tensile strength up to 35,000 lb. per sq.in. and an elongation up to 10 per cent, have been adopted as standard for die casting use.

Solder and Flux, All-Metal

Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill. (Vol.81,p.1006.)

This high-tensile-strength solder and all-metal flux is suitable for low-temperature soldering of such metals as aluminum, cast iron, die-cast metal, stainless steel and monel. Although this solder is applied at low temperatures, only slightly above those used for ordinary soft solders, it is claimed to form a bond having a high tensile strength.

Resins, Phenolic, Improved

General Plastics, Inc., N. Tonawanda, N. Y. (Vol.81,p.224.)

A line of improved "Durez" thermosetting phenolic resins in both liquid and powdered forms have been designed for numerous industrial bonding applications. Certain types, when used with rubber and drying oils or by themselves in impregnating or bonding loose

or woven asbestos, give the finished product a higher heat resistance, more strength and a uniformly stable coefficient of friction.

Flux, Soldering, "Rubyfluid"

Ruby Chemical Co., 68-70 McDowell St., Columbus, Ohio. (Vol.81,p.715.)

"Rubyfluid" soldering flux suitable for use with stainless steel is claimed to require no special soldering equipment or special solder. Flux does not give off strong, offensive odors.

Molding Material Low-Loss, No. 1601

General Plastics, Inc., North Tonawanda, N. Y. (Vol.18,p. 305.)

Durez No. 1601 is a phenolic molding compound having a power factor (power loss ratio) of 0.34 per cent, which is claimed to be considerably lower than for any material of its type.

Molding Material, Impact-Resistant

Bakelite Corp., 248 Park Ave., New York, N. Y. (Vol.81,p.302.)

This line of molding materials which range in impact strength, from 2.75 to 25 ft. lb. per square inch, may be classified as improved impact, medium impact, medium-high impact, and high impact. In each classification there are two or more molding materials.

Molding Material, No. 1590

General Plastics, Inc., North Tonawanda, N. Y. (Vol.81,p. 586.)

Durez No. 1590 is a phenolic molding material having an impact strength of 0.7 (A.S.T.M.). It molds and performs easily, has a relatively low bulk factor and, in molded form, has a somewhat rippled surface.

Molding Material, Plastic, Inert

General Plastics, Inc., North Tonawanda, N. Y. (Vol.81,p. 902.)

Durez 77 SB molding material is claimed to be an inert material suitable for products that must function in corrosive chemicals. It is also claimed to resist frictional wear and to permit machining operations without impairment of its water- and chemical-resistance properties.

Molding Material, Black, Durez No. 113

General Plastics, Inc., North Tonawanda, N. Y. (Vol.81,p. 755.)

Developed for radio cabinets and other large housings where appearance is important, Durez No. 113 Black, a molding material has a rich black color and permits the molding of long draws with a smooth lustre. Parts can be hard buffed without danger.

Corrosion-Resistant Material, Sprayable

American Concrete & Steel Pipe Co., Box 1428, Arcade Station, Los Angeles, Calif. (Vol.81,p. 1238.)

Dilute solutions of sulphuric, hydrochloric, nitric, acetic, hydrofluoric and other acids, caustics of all types, gasoline, oils, greases, hydrogen sulphite gas and other corrosive agencies are claimed to have no apparent effect upon "Amercoat" corrosion-resistant plastic material within a temperature range of from minus 50 to plus 150 F.

"Neoprene"

E. I. duPont de Nemours & Co., Wilmington, Del. (Vol.81,p.23.)

"Neoprene" has been adopted as a generic term for the chloroprene polymers formerly sold under the trade name "DuPrene." Products made from this material resist the deteriorating effect of oils, gasoline, solvents and refrigerants to a marked degree.

Lubricant, Rubber, Colloidal

Acheson Colloids Corp., Port Huron, Mich. (Vol.81,p.717.)

A formula for a composition containing colloidal graphite, claimed to be effective for lubricating rubber mechanical elements without softening the rubber, consists chiefly of a combination of "Dag" colloidal graphite, glycerine and water.

Oil, Lathe Center, "Superfilm"

Chicago Mfg. & Distributing Co., 1936 W. 46th St., Chicago, Ill. (Vol.81,p.1230.)

"Superfilm" lathe centerpoint oil is said to be free from animal and vegetable fats. This mineral oil is recommended for use on lathe centers, lathe steady and center rests, milling machines, universal grinders, cams, thrust bearings and other bearings requiring high-film-strength lubricants.

Oil, Cutting, Soluble

D. A. Stuart & Co., 2733 South Troy St., Chicago, Ill. (Vol.81, p.1235.)

Improved "Kleen-Kut" soluble cutting oil is claimed to give higher tool life and to have greater anti-rust value. It is composed mainly of petroleum derivatives and of raw materials of high quality. This oil is said to mix easily and quickly with moderately hard water at normal temperatures.

Oil, Cutting, "Nopco 1227-B"

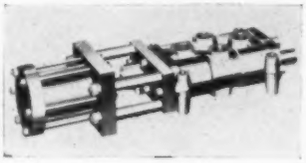
National Oil Products Co., Harrison, N. J. (Vol.81,p.716.)

"Nopco 1227-B" soluble cutting oil is suitable for turning, grinding, milling, drilling, light broaching and other metal-working operations. It is a combination of mineral and fatty oils treated to be soluble in cold or warm water.

Valve, Hydraulic, Pilot-Operated

C. B. Hunt & Son's Co., Salem, Ohio. (Vol.81,p.1008.)

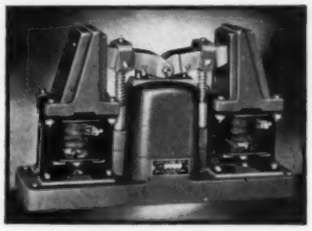
Embodying the same no metal-to-metal wear principle and small number of moving parts used in the line of "Quick-As-Wink" air control valves, this pilot-operated hydraulic valve is assembled in a drop-forged bronze housing.



Valve, Control, Air, Six-Way

C. B. Hunt & Son, Salem, Ohio. (Vol.81,p.262.)

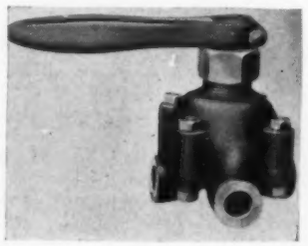
No. 1496, double-solenoid air control valve can be operated as a six-way valve or as a double three-way valve. Valve may also be used as a four-way, compound exhaust valve.

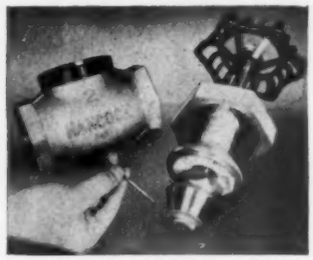


Valves, Control, Air, Style J

W. H. Nicholson & Co., 231 Oregon St., Wilkes-Barre, Pa. (Vol.81,p.1170.)

Style J air-control valves are available for air pressures up to 125 lb. per sq.in. in three- and four-way types. Bodies and seats are of semi-steel and flat disks are of bronze. These valves are made in ¼, ⅜, ½ and ¾ in. sizes.





Valves, Globe and Angle

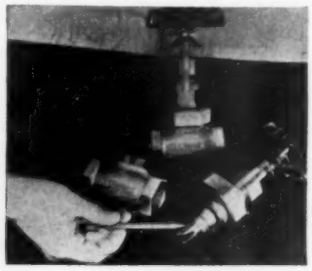
Hancock Valve Div., Manning, Maxwell & Moore, Inc., 3 Elias St., Bridgeport, Conn. (Vol.81,p.219.)

The addition of 1¼, 1½ and 2 in. sizes in globe and angle patterns completes this line of bronze valves. The 1 in. and smaller valves of this line were introduced about one year ago.

Valves, Bronze, "Flocontrol"

Hancock Valve Div., Manning, Maxwell & Moore, Inc., 3 Elias St., Bridgeport, Conn. (Vol.81,p.811.)

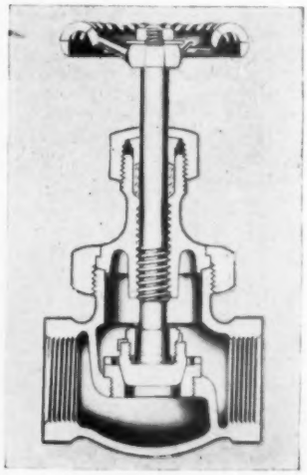
Completely redesigned line of bronze "Flocontrol" valves retain the basic proportional-flow or straight-line flow characteristics of the original valves. Stainless steel valve seats and disks having a hardness of 500 Brinell are used.



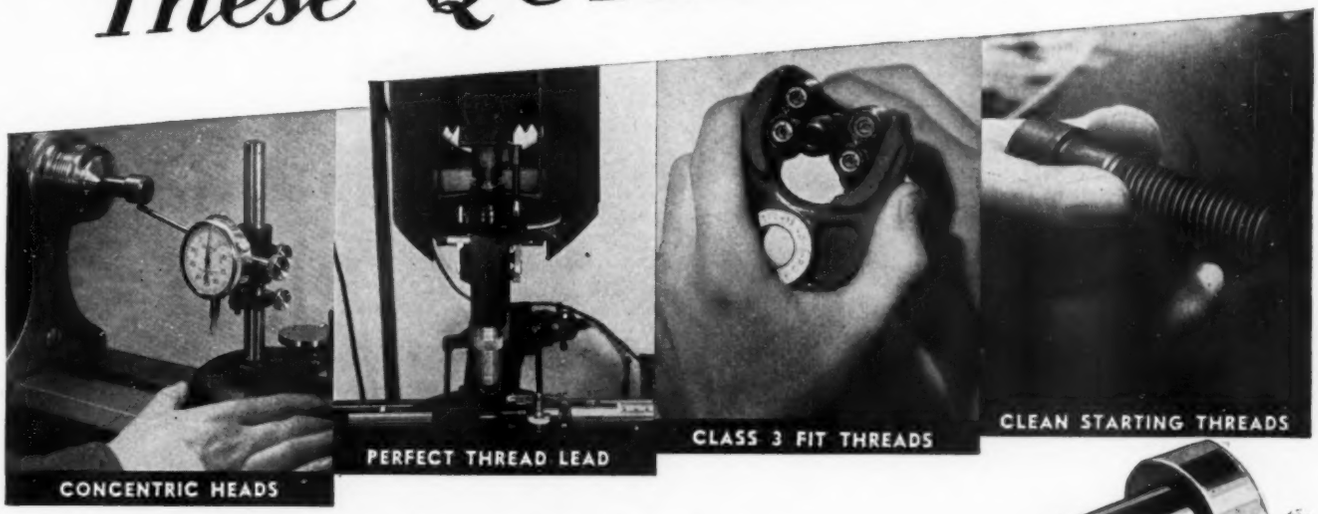
Valves, Plug-Type

Crane Co., 836 S. Michigan Ave., Chicago, Ill. (Vol.81,p. 1294.)

The No. 14½ P brass globe valves and No. 16½ P angle valves have nickel-alloy plug-



These QUALITIES...



..*have quickly won* WIDE ACCEPTANCE *for Parker-Kalon Socket Screws!*

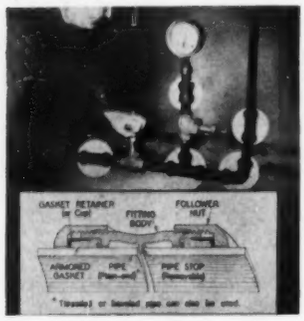
In the short span of six months Parker-Kalon *Cold-forged* Socket Screws have gained nationwide acceptance. It could not be otherwise. The reason is that they are more than a 'good' product. Two years of research and development... most modern production facilities... a laboratory, without counterpart in the industry, for controlling and maintaining the essential characteristics in Screws of this type... have been combined to produce a product of *unusual* quality.

If you demand precision... uniform strength... appearance ... in the Socket Screws you use—send for free samples. See for yourself how highly these important factors have been developed in Parker-Kalon *Cold-forged* Socket Screws.

PARKER-KALON CORPORATION
194 Varick Street New York, N. Y.

PARKER-KALON
Cold-forged
SOCKET SCREWS

type disks and Exelloy body-seat rings. Valves are available in sizes from ½ to 3 in. and are recommended for 300 lb. per sq.in. working pressure on cold water, oil or gas lines.



Pipe Fittings, Style 65

S. R. Dresser Mfg. Co., 283 Fisher Ave., Bradford, Pa. (Vol.81,p.304.)

This is a line of standard pipe fittings with which it is possible to complete a joint with only an ordinary wrench. Listed as Style 65, the line includes standard and extra-length couplings, ells (both 45 and 90 deg.) and tees.

Valves, Steel, "Duravalves"

Hancock Valve Div., Manning, Maxwell & Moore, Inc., 3 Elias St., Bridgeport, Conn. (Vol.81,p.1007.)

Developed especialy for high pressure and high temperature service, "Duravalve" steel valves are fitted with internal Stellite seats. These valves are claimed to be suitable for pressures of 1,500 lb. at 950 F. and are made in one basic size, then tapped, or bored for welding, for ½, ¾ or 1-in. pipe.

Screws and Bolts, Cold-Forged

Parker-Kalon Corp., 200 Varick St., New York, N. Y. (Vol. 81,p.896.)

This line of hollow-head setscrews and socket-head cap-

screws and stripper bolts is cold-forged from "Parkaloy" chrome-nickel alloy. Forging process used is claimed to produce an unbroken fibrous structure with concentration of metal at points subjected to strain.

Dampener, Pulsation, Hydraulic

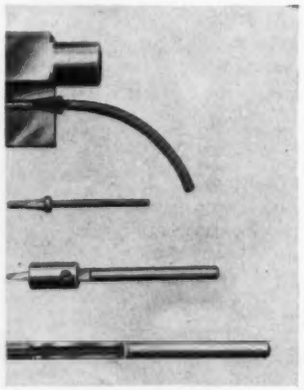
Jas. P. Marsh Corp., 2073 Southport Ave., Chicago, Ill. (Vol.81,p.427.)

This pulsation dampener is a construction which protects gages from the effects of excessive pulsation in pressure. Dampener functions to level off the peaks and valleys of oscillating pressure so that the indicating hand stands still or moves slowly back and forth over a limited area.

Bushing Connection

Bijur Lubricating Corp., 22-08 43rd Ave., Long Island City, N. Y. (Vol.81,p.866.)

Drive bushing connection provides efficient tubing connection on lubrication feed lines to bearings where space is limited and there is insufficient room for any type of threaded nut or conventional bushing.



Valve Mechanism, Model C, Type 1

Automatic Temperature Control Co., Inc., 3½ East Logan St., Philadelphia, Pa. (Vol.81,p. 1296.)

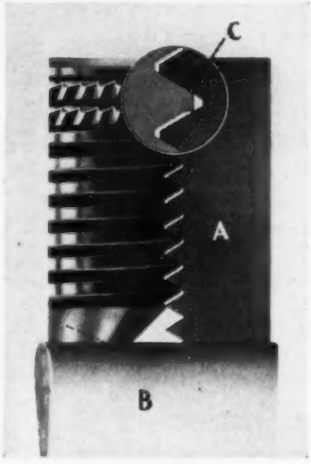
Listed as Model C, this Type 1 motor valve mechanism is de-

signed to operate slip stem valves for heavy pressures in the larger sizes. The mechanism shown exerts an opening and closing force on the valve stem of 2,000 lb. with 5 in. per min. movement.

Setscrews, Self-Locking

Standard Pressed Steel Co., Jenkintown, Pa. (Vol.81,p. 1119.)

Knurling the two top threads of the "Unbrako" socket setscrew is claimed to make it self-locking. This knurling raises sharp prongs all around the edge of the thread which dig into the threads of the tapped hole.



Screw, Thread-Cutting

Shakeproof Lock Washer Co., 2501 N. Keeler Ave., Chicago, Ill. (Vol.81,p.1233.)

Designed to cut its own thread in metals and plastics of practically any thickness, this thread cutting screw has standard machine-screw threads. Should it ever be necessary to replace the screw, an ordinary machine screw of the same size will fit its thread. Sizes range from No. 4-40 to ⅜-16.

Hose, Steam, Asbestos

New York Belting & Packing Co., 1 Market St., Passaic, N. J. (Vol.81,p.259.)

"The "Great Seal Asbestos Cord" steam hose is made with four asbestos cord plies wound spirally in alternating directions around a steam- and heat-resisting tube. This hose comes in ½, ¾, 1, 1¼ and 1½ in. inside-diameter sizes and will accommodate pressures ranging from 175 to 200 lb.

Hose, Steam

United States Rubber Products, Inc., 790 Broadway, New York, N. Y. (Vol.81,p.265.)

"U. S. Royal" asbestos-cord steam hose No. P-6031 is constructed of steam- and heat-resisting rubber tube with four-ply asbestos cord wound spirally in alternating directions. This hose is made in ½, ¾, 1, 1¼ and 1½ in. inside diameter sizes. Pressure ranging from 175 to 200 lb. are permissible.

Packing, Asbestos

B. F. Goodrich Co., Mechanical Rubber Goods Div., Akron, Ohio. (Vol.81,p.675.)

A sulphur-free, neoprene, bonded, compressed asbestos sheet packing, listed as Prenite 20M, offers increased resistance to oil, as well as to refrigerants.

Screens, Long-Mesh

Ludlow-Saylor Wire Co., Newstead Ave. & Wabash R.R., St. Louis, Mo. (Vol.81,p.144and 426.)

An improved "Sta-Tru" long-mesh type woven-wire screen that is particularly adaptable for use on vibrating-screen equipment has been designed so that the pull of tensioning members of the screening equipment is exerted exclusively on straight, uncrimped staybars of high tensile strength.

Chart, "SAE-Namel"

Mill Service, P. O. Box 763, Springfield, Ohio. (Vol.81,p. 1119.)

Illustrating in detail the color code for marking steel bars recently promulgated by the U. S. Department of Commerce, the "SAE-Namel" chart measures 22x36 in. and lists by S.A.E. steel numbers, with corresponding code colors and combinations, all of the 89 S.A.E. steels included in the Color Code as officially promulgated.

Colors, Marking

Dyken Co., 2301 N. 11th St., St. Louis, Mo. (Vol.81,p.1119.)

Metal marking colors, which may be applied by rubber stamping or by stenciling, are offered for marking part numbers, alloy numbers, name, date, or other identification on metal surfaces of all types.

PRECISION BEARINGS

FOR EVERY LOAD, SPEED AND DUTY

108 DISTINCT SERIES

BALL, ROLLER AND THRUST

OVER 3000 SIZES

⅛" to 21" Bore—Metric and Inch Sizes

Write for the Catalog and Engineering Counsel

NORMA-HOFFMANN BEARINGS CORP'N.—STAMFORD, CONN., U. S. A.

"NORMA-HOFFMANN"

Separable (Magneto) Ball Bearing

Litro ("CL") Composition Retainer Ball Bearing

Single Row Ball Bearing

Double Row Self-Aligning Ball Bearing

Shielded Type Single Row Ball Bearing

Single Felt Seal Ball Bearing

Double Felt Seal Ball Bearing

9000 Series (Feltless) Sealed Ball Bearing

Cartridge Fully Sealed Refillable Type Ball Bearing

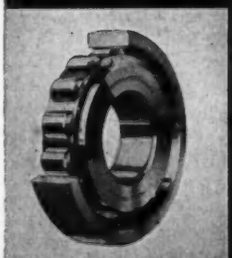
Double Row Ball Bearing

Extra Light Type Ball Bearing

Duplex Type (Two Direction) Angular Contact Ball Bearing

Angular Contact Ball Bearing

Single Direction Ball Thrust Bearing

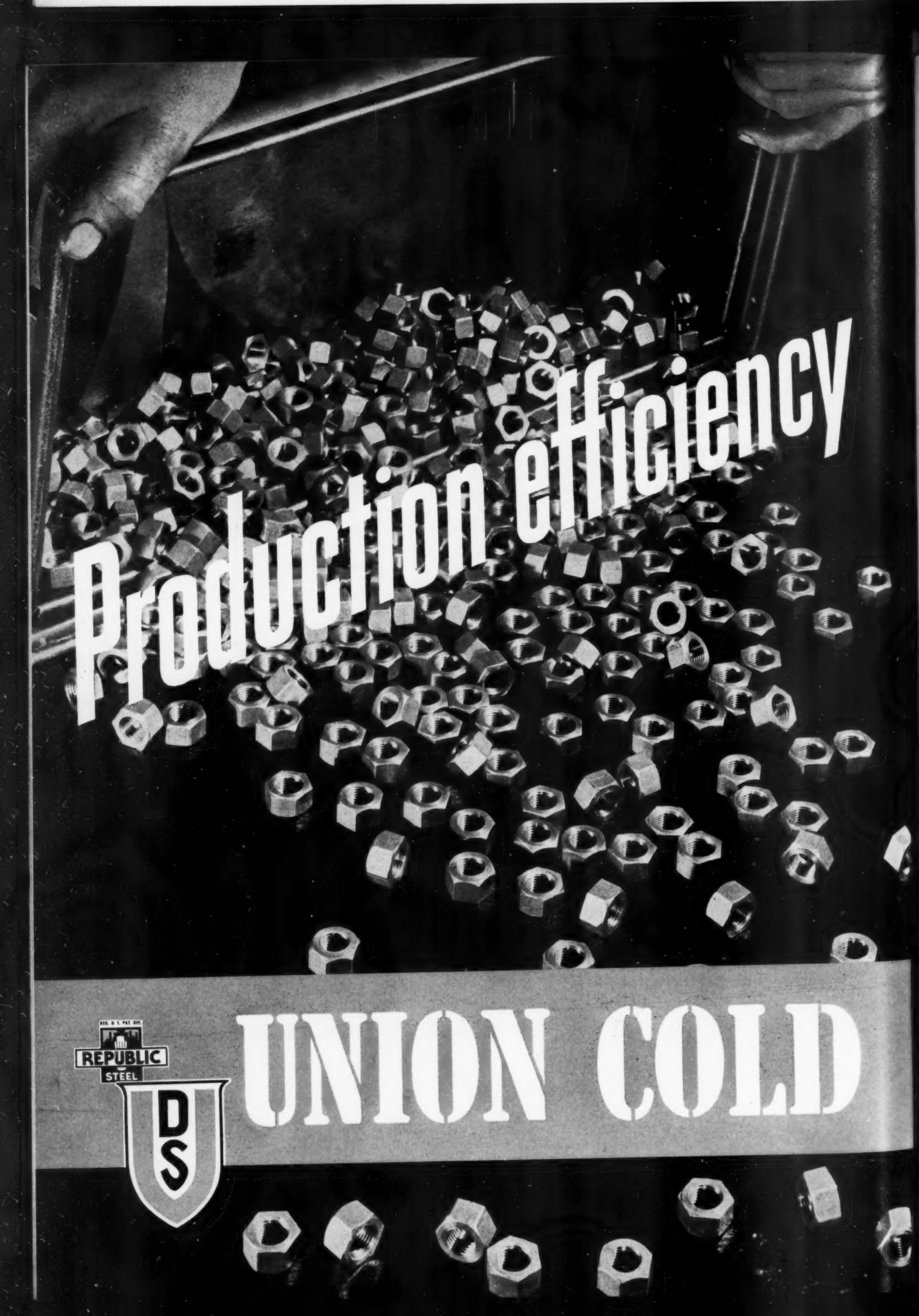

Standard Cylindrical Roller Bearing

Double Row Self-Aligning Adapter Ball Bearing

Full Type (Retainerless) Cylindrical Roller Bearing

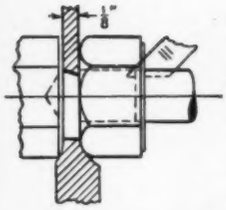
Extra Light Cylindrical Roller Bearing

Two-Lipped Cylindrical Roller Bearing


Production efficiency
REPUBLIC
STEEL
DS
UNION COLD

JUMPED 24%

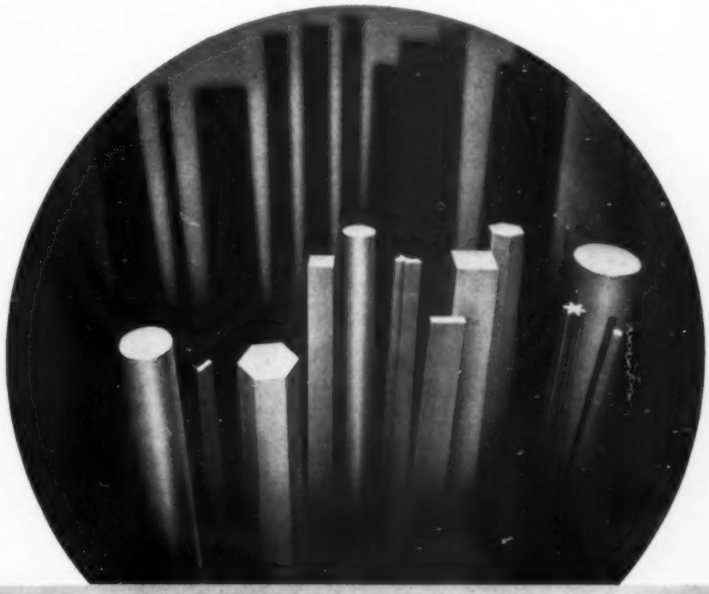
WHEN UNION SUPERCUT WAS USED



Like yourself, they wanted to cut production costs. They couldn't increase speeds. The ⅝" single spindle automatics were being run at top speed in milling these nuts from ¾" hexagon ordinary S. A. E. 1112 steel bars.

On recommendation of a Union Drawn field service man they changed to Union Supercut High Sulphur Bessemer Screw Steel. Due to 30% longer tool life and less "down-time," production efficiency jumped from 75% to 93% and has been maintained constantly at that higher figure. Increased feeds resulted in a further gain of approximately 25% in hourly output. And the product showed a much better finish.

If you are seeking means for lowering production costs without the necessity of buying new equipment, investigate the possibilities of Union Supercut. Ask us to send a Union Drawn field man to work with you. Union Drawn Steel Division of Republic Steel Corporation, Massillon, O.



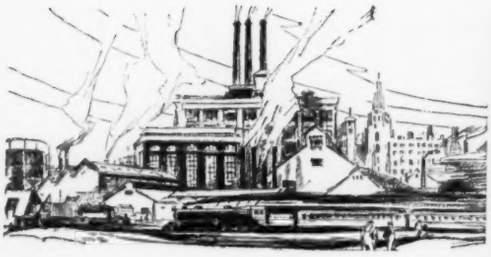
DRAWN STEELS

UNION SUPERCUT • UNION COLD DRAWN SPECIAL SECTIONS
UNION FREECUT • UNION COLD FINISHED ALLOY STEELS
UNION HYMO • UNION PRECISION SHAFTING
UNION SPECIAL FINISH

SKF *Bearings give*

RIGIDITY

to spindles of turret lathes



BUILT BY THE WARNER & SWASEY CO. SKF-EQUIPPED

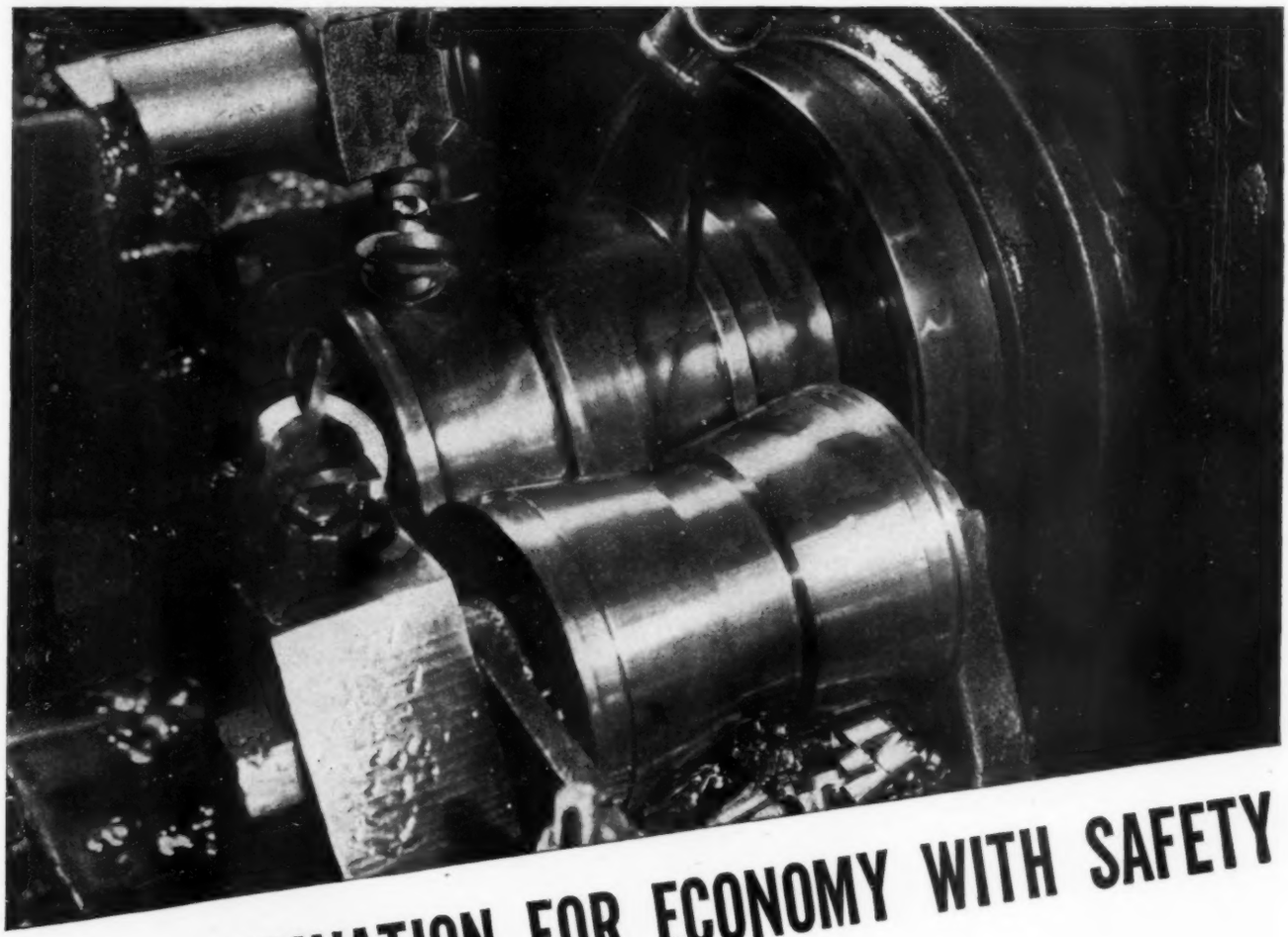
On job after job with this SKF-equipped lathe, many advantages stand out. There is smooth, low-cost running of heavy cuts free from chatter. There are high spindle speeds. *There is permanent precision at the cutting point.*

All these advantages are insured by a new SKF Spindle Mounting. An SKF tapered bore double-row cylindrical roller bearing on the work end and a ball bearing combination on the rear make spindle rigidity *permanent.*

No wonder more than 200 machine tool manufacturers select SKF Bearings. What SKF's are doing for them, they can do for you. 4066

SKF INDUSTRIES, INC., PHILA., PA.

SKF BALL AND ROLLER BEARINGS



THE COMBINATION FOR ECONOMY WITH SAFETY

Machinability is always important to the steel user. It is doubly important to the manufacturer who must maintain a high safety factor in his product. Controlled machinability, as practiced in the production of TIMKEN Alloy Steel, assures the highest free-machining quality possible without endangering vital service characteristics.

It is primarily the result of a combination of correct grain size, uniform metallographic properties and cleanliness.

GOOD WILL BASED ON GOOD STEEL

When a steel user adopts TIMKEN Steel his requirements are thoroughly analyzed to determine the most satisfactory manufacturing practice. This subsequently becomes standard procedure for that particular user.

We will be glad to discuss your steel problems at any time.

TIMKEN STEEL AND TUBE DIVISION
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; Timken Rock Bits; and Timken Fuel Injection Equipment.

TIMKEN
ALLOY STEELS

QUALITY PERFORMANCE

"Commercial" ANNULAR BALL BEARINGS

"Commercial" ANNULAR BALL BEARINGS are built in a large and splendidly equipped plant manned and directed by bearing experts . . . . men who *know* bearings and how to make them. The Quality of these bearings begins with the selection of steels — tough, high grade steels, carefully heat-treated to withstand over-loads, side thrusts, high speeds and unusual shocks and strains. Every process in the manufacture of "Commercial" ANNULAR BALL BEARINGS is carefully supervised with frequent tests and inspections.

When you use these bearings in your plant machinery or in your product, you are definitely assured of efficient bearing performance. The demand for "Commercial" ANNULAR BALL BEARINGS increases day by day, year by year. There can only be one reason for this nation-wide acceptance . . . . *better bearings at a moderate price.*

If you would like to know more about "Commercial" ANNULAR BALL BEARINGS; if you would like to know how they cut bearing costs, write for catalog and price list.

THE SCHATZ MANUFACTURING CO.
POUGHKEEPSIE, N. Y.
Detroit Sales Office: 2608 Book Tower
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SPEEDS UP TO 2500 R. P. M. • DUAL-THRUST CAPACITY • SELF-CONTAINED

WHEN THEY SAY

it's made of Aluminum

How frequently, on examining some article or piece of equipment, you're told that "It's made of Aluminum." New product or old one modernized? Is it fabricated entirely of Aluminum or with strategic parts made of this lightweight, high strength material? No haphazard selection of metals is responsible for decisions to use Aluminum. The reasons are here:

LIGHT IN WEIGHT . . . Chief among reasons for the widespread adoption of Aluminum is its light weight — about one third that of steel. Handling is made easier for fabricator and user, mechanical problems are simplified, life of the product is lengthened, maintenance reduced.

STRENGTH TO SUIT . . . Alloys developed by extensive research give Aluminum properties to suit exacting requirements. Strengths within a wide range of limits are available. Other properties can likewise be varied according to the need.

RESISTANT TO CORROSION . . . Aluminum has the ability to withstand the corrosive attack of the atmosphere, of many gases, chemicals and compounds. In process equipment, in consumer goods, this property of Aluminum is safeguarding quality, assuring long life.

FINE APPEARANCE . . . A wide variety of attractive finishes are possible with Aluminum. The finishes are lasting. Novel effects can be obtained at little cost. Aluminum products have sales appeal.

When you, as designer, manufacturer or distributor, are weighing these advantages of Alloys of Alcoa Aluminum, feel free to ask our engineers for advice. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh, Pennsylvania.

MADE *Economically* OF ALLOYS OF ALCOA ALUMINUM

ALCOA

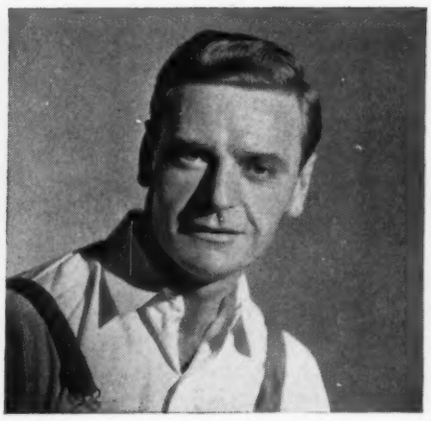
ALUMINUM

ALCOA · ALUMINUM

They ALL Agree on SHELBY *for* AUTOMOTIVE PARTS

THE DESIGNER

"I specify SHELBY because it gives me freedom to design. And when I need assistance in laying out a new part, the SHELBY man is right on the job."



THE SHOP MAN

"I like to work with SHELBY because it machines readily. We get fewer rejects with SHELBY. Besides, it's easier on our tools, because it's always uniform."

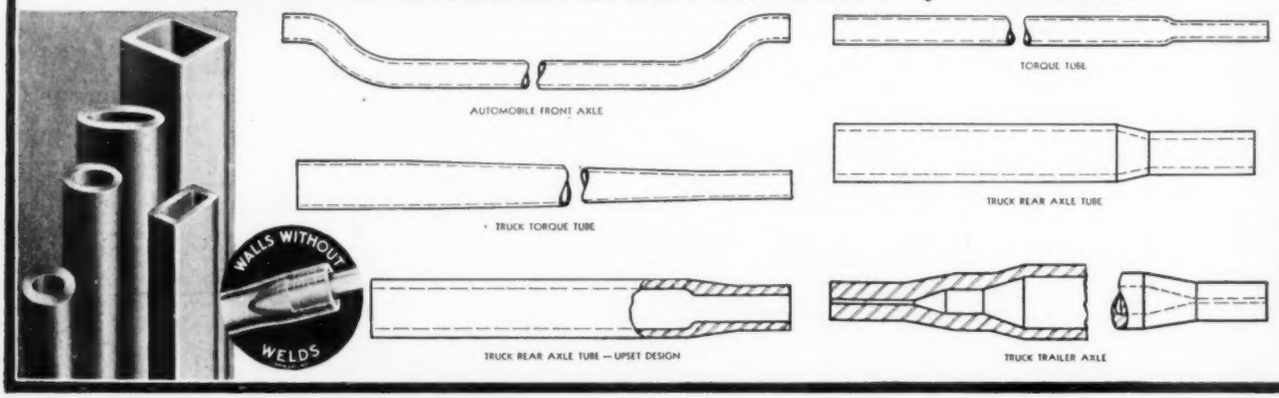
THE PARTS BUYER

"I've found, in buying automotive parts for a number of years, that there's no better indication of overall quality and precision workmanship than the name SHELBY.

AXLES, rear axle housings, steering columns, drag links, tie rods, torque tubes, brake cross shafts, spring shackle bushings for "Knee Action", and seat frames—these are some of the parts leading automobile manufacturers are making from SHELBY Seamless Tubing. They know that only the finest steel tubing has the necessary uniformity to satisfy the requirements of modern mass-production methods. That's why they use SHELBY.

Call the SHELBY Distributor in your vicinity. He carries in stock a wide assortment of tubing—in various shapes, sizes, lengths, wall thicknesses, finishes, and grades of steel. You'll find him a specialist on tubular construction, able to give you valuable aid in the selection and use of mechanical tubing for modern automobile parts.

TUBULAR AUTOMOBILE SPECIALTIES *made from* SHELBY



NATIONAL TUBE COMPANY

PITTSBURGH, PA.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

M-R-C *Ball Bearings*

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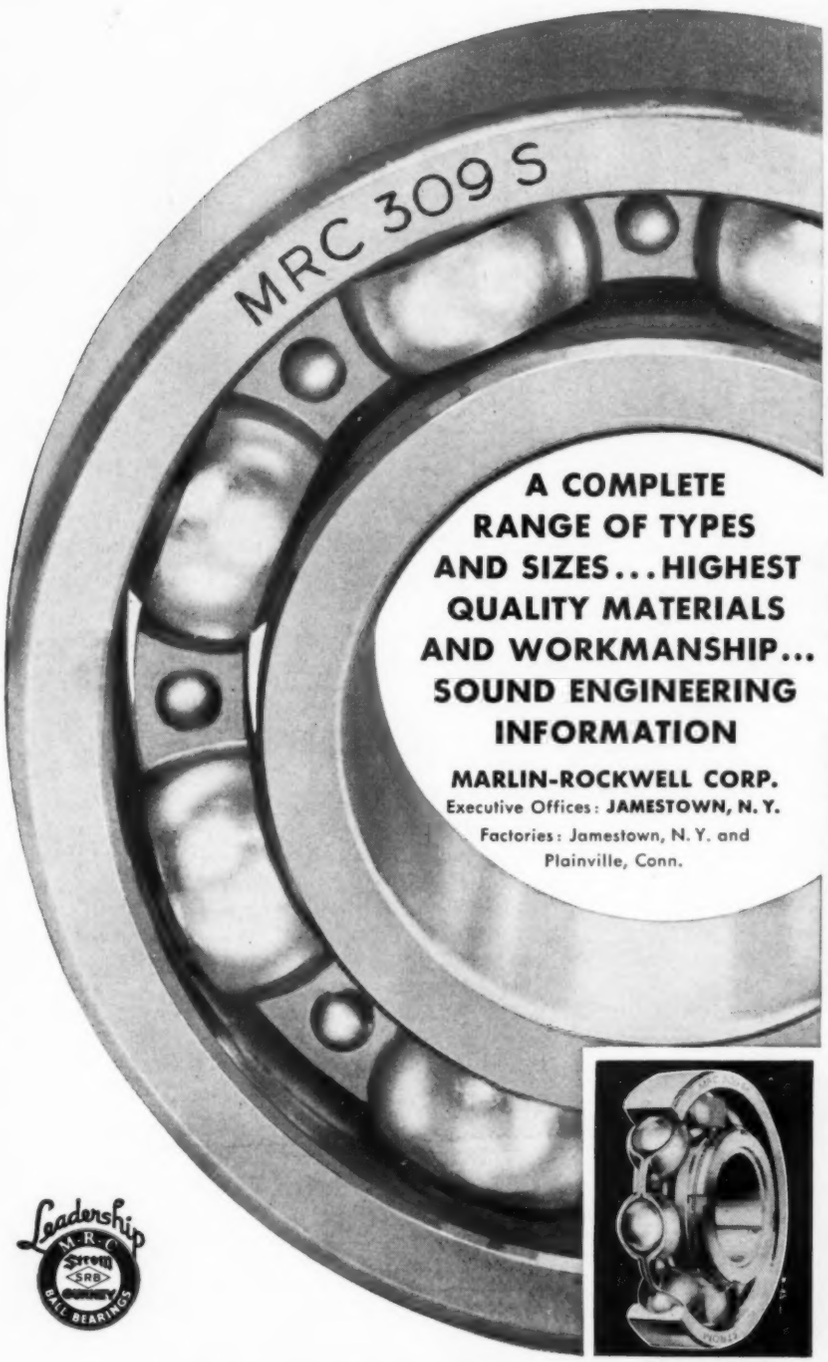

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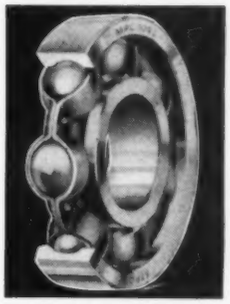
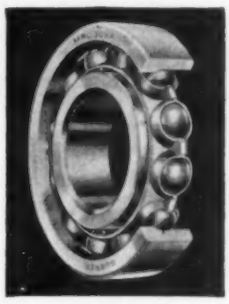
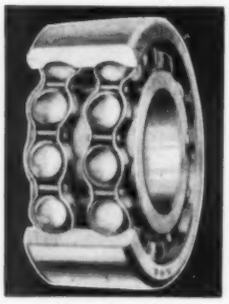
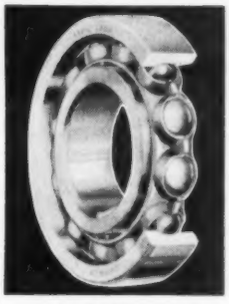
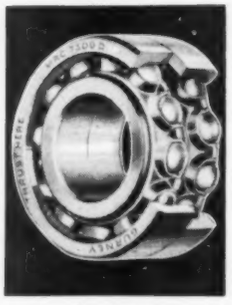

Super-Conrad Type S

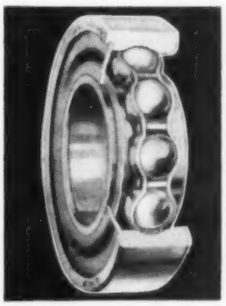
Maximum-Capacity Type M

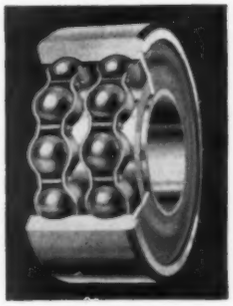

Radial Type R


Double-Row

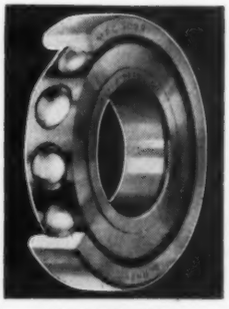

Radio-Thrust

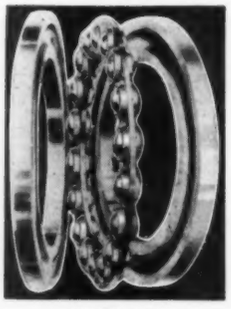

Duplex


"Lubri-Seal". Single and Double Shield. Types F & FF


"Lubri-Seal" Double-Row —Shielded Type F

Adapter Type


Super-Precision


Flat-Thrust

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. . . . has been setting a *Standard for Quality and New Developments*

Fig. 1446 "Unbrako" Socket Head Stripper Bolt

Fig. 232 "Unbrako" Hollow Set Screw

Fig. 1434 Knurled "Unbrako" Socket Head Cap Screw

U.S. & Foreign Pat's. Pending

Fig. 1564 "Unbrako" Self-Locking Hollow Set Screw

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The millions (yes, millions) of "Unbrako" Socket Screws that have been used by all lines of industry during these years have been their own best recommendation. They have given a complete satisfaction that has resulted from our years of unceasing experimentation with different metals and alloys . . . our constant search for better methods of heat treating . . . our development of new ideas such as the Knurled Socket Head Cap Screw and the Self-Locking Hollow Set Screw.

Accuracy and uniformity of manufacture have long been accomplished facts familiar to those who know and use them.

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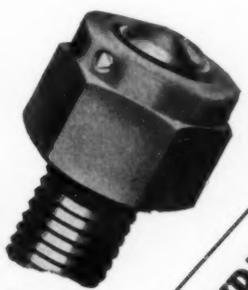

Fig. 1513 Pat'd & Pats. Pending

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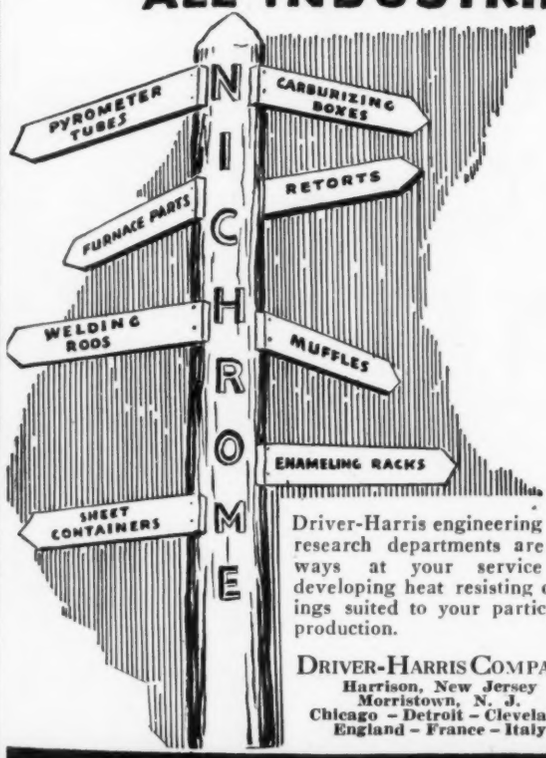

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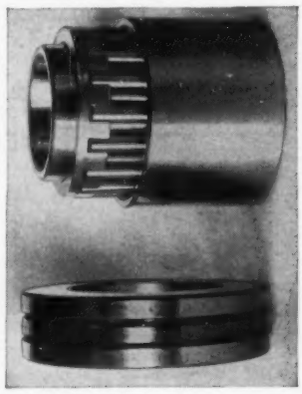

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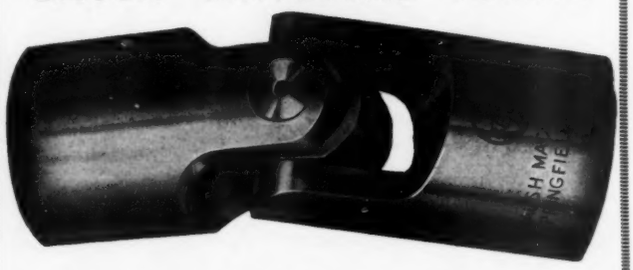

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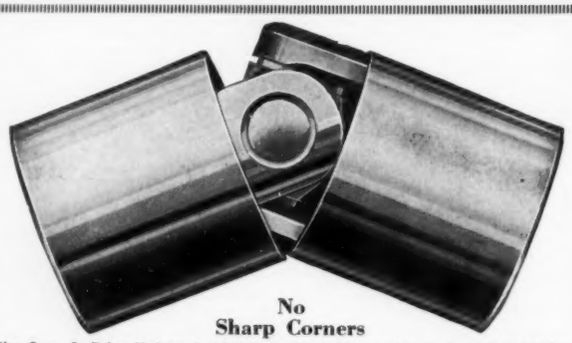

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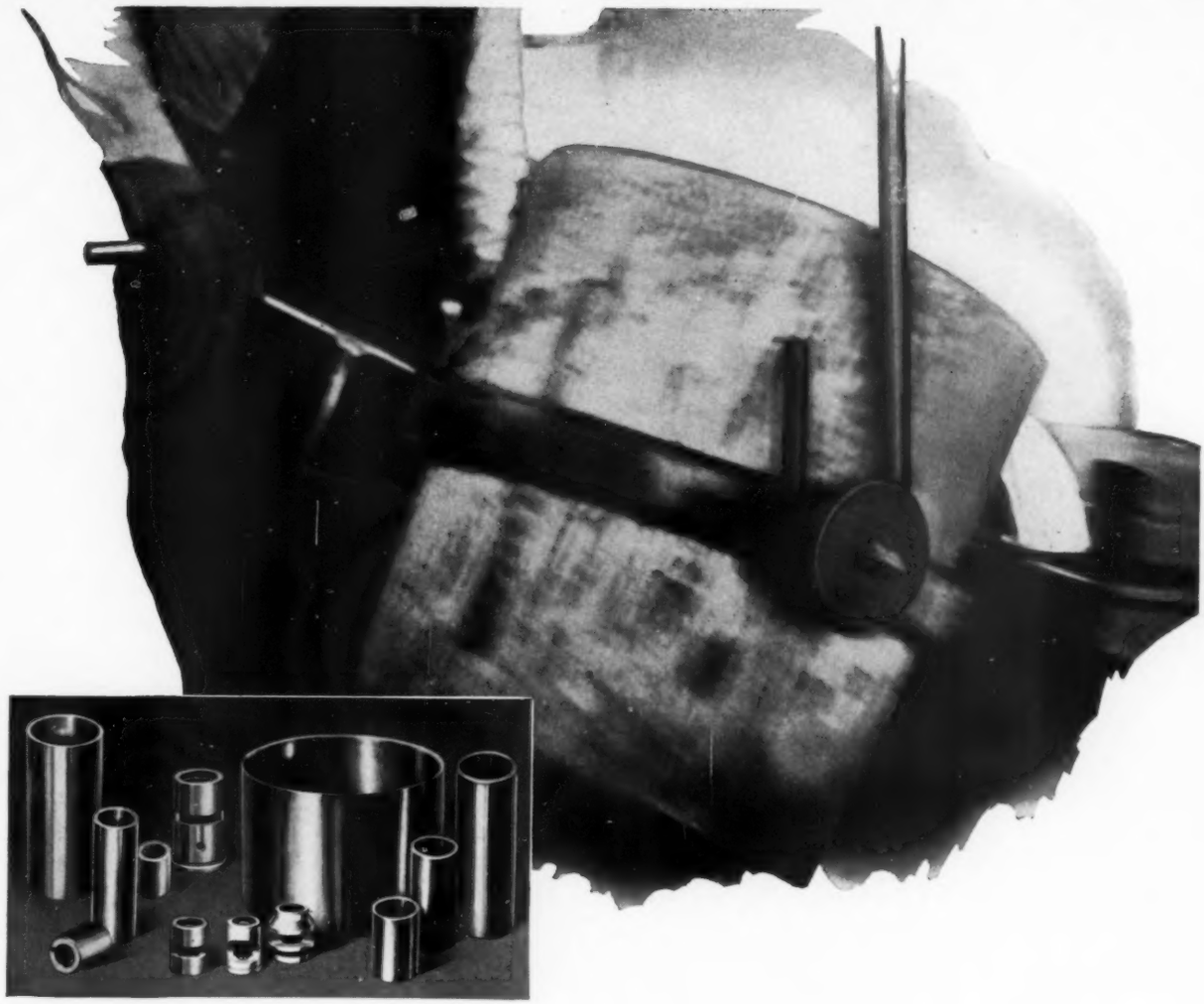

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You can buy from stock Bunting Bearings completely machined, ready for assembly, in over 600 different sizes and Finished Bunting Bearings for service replacement in all makes of electric motors from 1/40 to 60 hp. These Bunting Standardized Bearings are available instantly in any quantity at low cost, making it convenient for you to enjoy Bunting Quality with no sacrifice of time nor investment. Write for catalog.

Cored and Solid Bars of Bunting Bearing Bronze in 200 sizes and Bunting Lead Base and Genuine Babbitt are also available from stock. Ask any leading mill supply wholesaler or write for catalog of sizes and prices... The Bunting Brass & Bronze Company, Toledo, Ohio. Branches and Warehouses in All Principal Cities.

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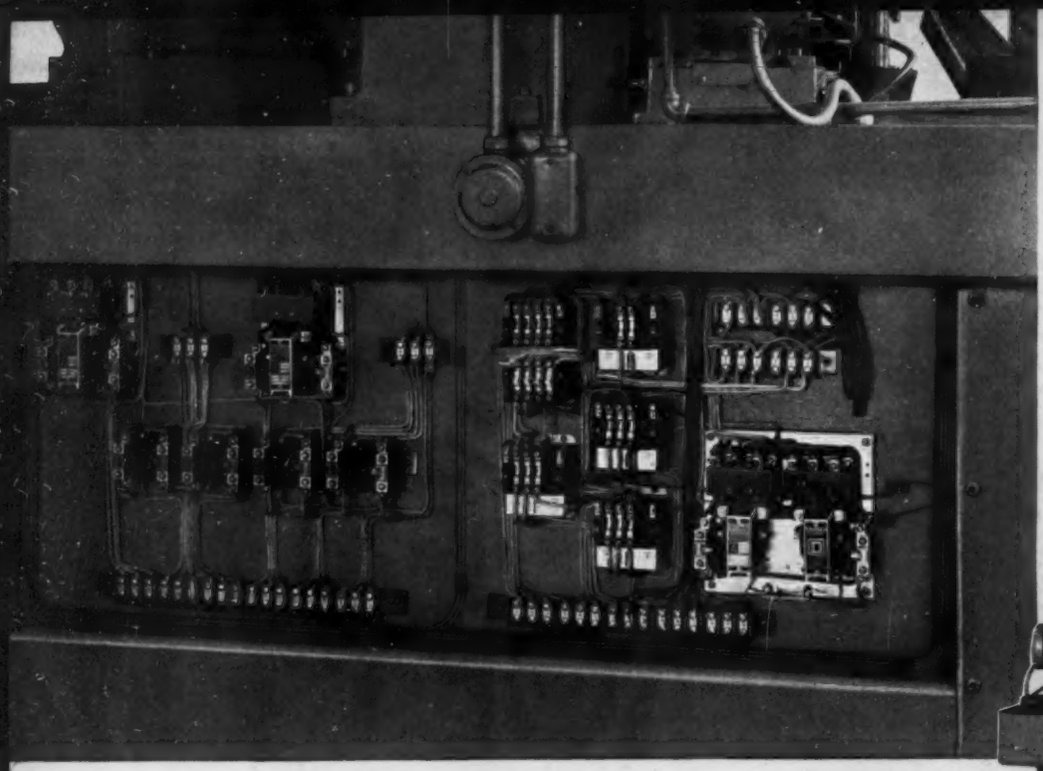
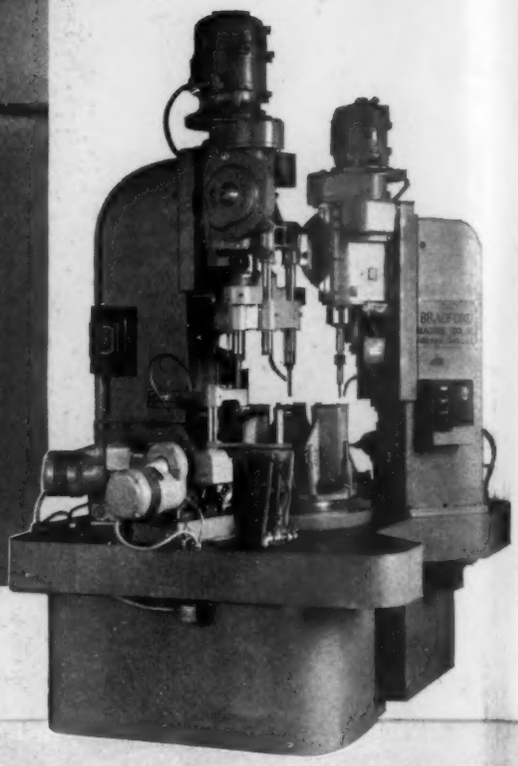




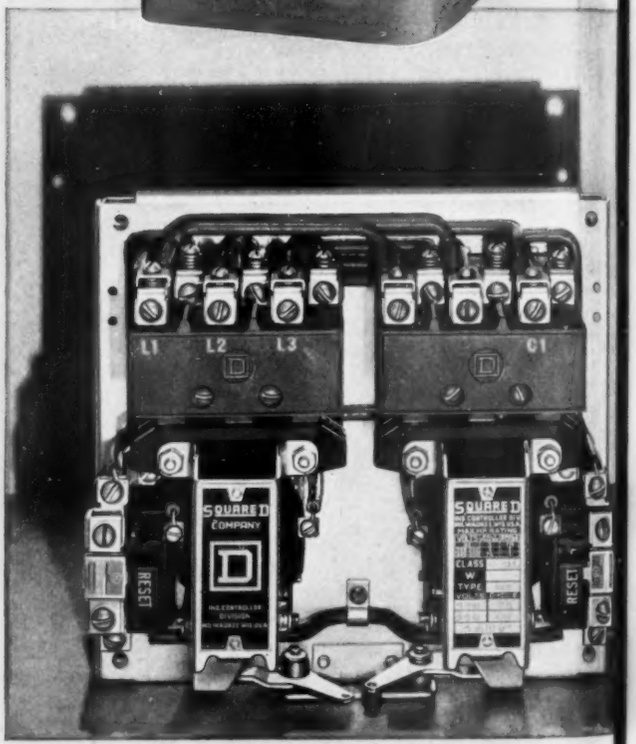
THE NEW SQUARE D AUTOMATIC, VERTICAL OPERATION MOTOR STARTERS PROVIDE COMPACTNESS, CONVENIENCE AND ACCESSIBILITY FOR BUILT-IN MACHINE TOOL CONTROL . . .

Compact design, convenient arrangement for mounting, and accessibility of all parts for inspection or maintenance are important features in the selection of motor control for machine tool applications—particularly when the control is built into the machine.

The new Square D automatic starters have vertical action with an "E" type magnet. This permits compact design, prevents accidental closing and eliminates all flexible connectors. The contactors and relays are mounted on steel plates with no wiring or live parts on back. The plates are flanged so as to clear the screw-heads and can be mounted on flat surfaces without the use of spacers or mounting posts.

For inspection or maintenance the entire movable contactor assembly swings forward, giving easy access to contacts and magnet coil.

The illustrations show a six-unit machine for drilling, reaming and tapping automobile steering knuckle arms —equipped with automatic starters, reversing starters, relays, limit switches and thermal overload protection —all Square D.



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SQUARE D COMPANY CANADA LTD. TORONTO, ONTARIO

Electrical Equipment

COOPERATION on the part of the electrical equipment manufacturer, the builder of production equipment and the users of both continue to result in improvements in available electrical equipment, the development of new products and a widening of the field of application of such equipment. Machine tool requirements for better-balanced drive motors has forced careful attention to the problem of proper dynamic balancing methods.

Likewise, the application of electric control units to metal-working equipment is resulting in continued improvements in this type of apparatus. Units are made heavier and are protected to withstand misuse by unskilled and semi-skilled workers. Several machines have been developed in which complete electric control from push-button stations is possible and these are proving satisfactory.

One of the interesting developments announced during the past year is a line of illuminated push-button stations incorporating an indicating lamp in the center of the translucent button. Individual transformers for supplying current to the lamps are designed for mounting back of the pushbutton station or in the machine control box. Buttons are available in white, green, blue, red, clear and amber colors, for easy identification.

A definite time relay, employing a clutch-type time-delay interlock, has been developed to provide a reliable means of timing a sequence of operations in a control system. These relays are available for a.c. or d.c. use with two, four or six circuits.

Improvements in motor starting and control equipment include a new thermal overload switch for fractional-horsepower motors. This unit is built into the motor and operates to disconnect the motor from the line when the windings have reached the limiting temperature for safe operation. The device automatically reconnects the motor when the windings are again at a safe temperature.

Resilient rubber mountings for small motors are finding considerable application. One line of fractional-horsepower motors has a special resilient, belt-tightening mounting in which the weight of the motor provides the initial belt-tightening effect. Another line of resilient-mounted motors uses a sheet-steel base shaped in the form of a cradle and has the rubber mounting supports as close to the shaft center as possible. Large rings of rubber, which support the motor, are vulcanized to inner and outer rings.

TWO GREAT MONEY SAVERS

"MERGE"

WESTINGHOUSE NOFUZE "DE-ION" CIRCUIT BREAKER

WESTINGHOUSE "DE-ION" LINESTARTER

WESTINGHOUSE "DE-ION" COMBINATION LINESTARTER

Two outstanding performers in the motor control and circuit protective fields are now combined in one compact unit. The De-ion Linestarter and the Nofuze Circuit Breaker are brought together in the Westinghouse Combination Linestarter.

Eliminating the fuse outage costs plus assuring dependable starter performance, the Combination Linestarter is today's most thrifty buy.

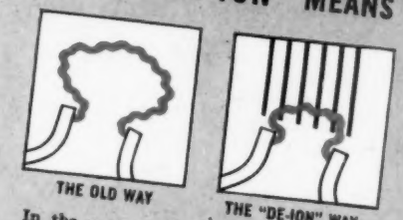
- IT SAVES IN INSTALLATION COST
- IT REDUCES OPERATING COST
- IT'S COMPACT
- AND IT'S SUPER-SAFE

Get the booklet "4 Points to Check" before installing any starters or circuit breakers. It will save you money. Simply write or phone your nearest:

Electrical Contractor	Industrial Agent
Electrical Wholesaler	Motor Dealer

Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

WHAT "DE-ION" MEANS



THE OLD WAY — THE "DE-ION" WAY

In the past, arcs have been broken by "stretching". The "De-ion" quencher confines, divides and extinguishes the arc almost instantly—obviously preventing burning heat on contacts or arc barriers.

CHECK THESE 9 FEATURES

- FULL SAFETY
- COMPLETE MOTOR AND CIRCUIT PROTECTION
- BI-METALLIC OVERLOAD PROTECTION
- FRONT OPERATING HANDLE
- AMPLE WIRING SPACE
- UNUSUAL ACCESSIBILITY
- COMPACT SIZE
- ATTRACTIVE APPEARANCE
- LOWER INSTALLED COST

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"DE-ION" COMBINATION LINESTARTERS

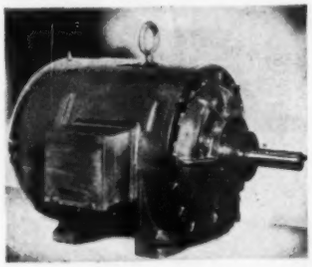
MOTORS • LINESTARTERS • CIRCUIT BREAKERS • SAFETY SWITCHES • PUSH BUTTONS

Motors—Controllers—Rectifiers and Transformers—Photo-Electric Elements—Miscellaneous

Motors, Fan-Cooled, Type CS

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol. 81,p.593.)

Motor frames of the dual-ventilated, fan-cooled Type CS squirrel-cage motors contain two separate sets of air ducts, one internal and one external. An internal fan on the rotor circulates warm air through the internal ducts, the walls of which are cooled by an external fan.



Motors, Universal

Dumore Co., Racine, Wis. (Vol.81,p.631.)

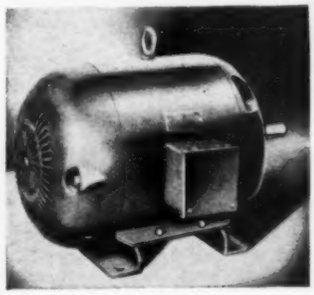
Totally-inclosed motor, Type H, is rated at 1/50 hp. at 6,500 r.p.m. for 30-min. duty. Type HV motor is of the open type and is rated at k/50 hp.

at 5,000 r.p.m. continuous duty, or 1/55 hp. at 4,000 r.p.m. for 30-min. duty. These motors are available with sleeve or ball bearings and with worm-gear speed reduction units.

Motors, Inclosed, Type CP

Wagner Electric Corp., St. Louis, Mo.. (Vol.81,p.632.)

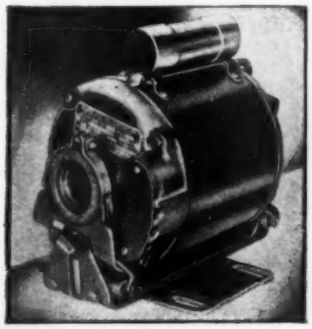
Type CP totally inclosed, fan-cooled motors are designed for use in atmospheres laden with abrasive dusts, metals, salts, gases or extreme dampness. An external blower is mounted on the front end to direct cooling air around and over the corrugated surfaces of the stator.



Motors, Resilient Mounted

Wagner Electric Corp., St. Louis, Mo. (Vol.81,p.591.)

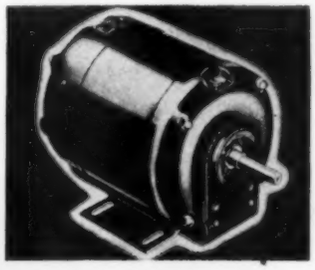
Annular, resilient mountings are now available on ¼- to 1-hp. repulsion-start-induction, split-phase, capacitor and polyphase types of electric motors. Rubber mounting supports, which absorb the vibration, are as close to the shaft center as possible. Motor bases are of sheet-steel and are shaped in the form of a cradle.



Motors, Resilient-Mounted

The Ohio Electric Mfg. Co., 5914 Maurice Ave., Cleveland, Ohio. (Vol.81,p.1290.)

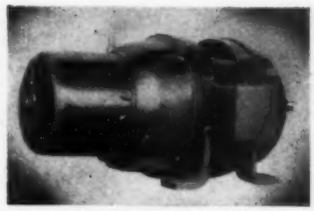
Available either with a standard solid base with resilient mounting, as shown, or with a special resilient, belt-tightening mounting, these fractional horsepower motors are made in sizes ranging from ⅛ to ½ hp. Standard sizes are available for 900, 1,200, 1,800 and 3,600 r.p.m. operations.



Motor, Electric, "Disk-Brake"

Reliance Electric & Engineering Co., 1042-1090 Ivanhoe Rd., Cleveland, Ohio. (Vol.81,p. 675.)

The "Disk-Brake" motor combines in a single unit the

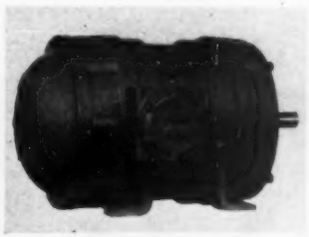


functions of a motor with those of a power brake. These units are designed especially for equipment in which quick, automatic and accurate stopping or holding of a load is necessary. Motors of any operating characteristics, both d.c. and a.c., may be specified.

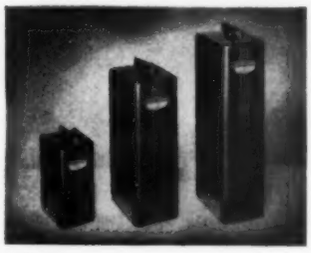
Motors, Type AA, Explosion-Proof

The Reliance Electric & Engineering Co., 1042-1900 Ivanhoe Road, Cleveland, Ohio. (Vol. 81,p.1296.)

Type AA explosion-proof, squirrel-cage, a.c. motors have mounting dimensions conforming to N.E.M.A. standards. These motors have been tested



and approved by the Underwriters' Laboratories for Class 1 Group D hazardous locations. Construction is such that all working parts are completely inclosed.



Controllers, Drum-Type

Cutler-Hammer, Inc., 205 N. 12th St., Milwaukee, Wis. (Vol.81,p.266.)

This line of fractional-hp. drum controllers is designed for use with reversible a.c. squirrel-cage motors and reversing or non-reversing multi-speed squirrel-cage motors driving machine tools and similar machines where speed regulation is desired.

Switches, Control, "Rotating-Cam"

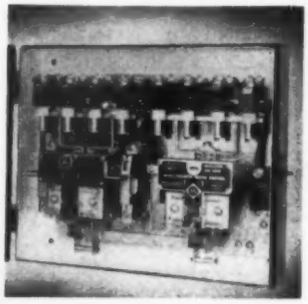
General Electric Co., Schenectady, N. Y. (Vol.81,p.266.)

Rotating-cam switches, designed especially for built-in control applications, are adaptable to a variety of electrical functions and machine requirements. Designated as G-E CR3300 rotating-cam switches, the line is manufactured in a number of electrical and mechanical modifications.

Controller, Reversing

Allis-Chalmers Mfg. Co., Condit Works, Boston, Mass. (Vol. 81,p.717.)

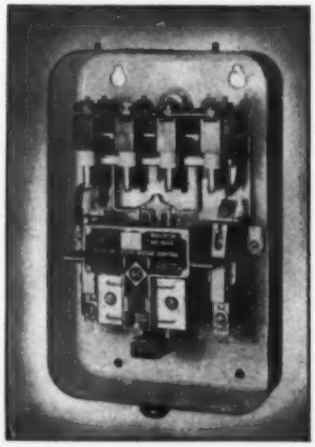
Consisting of two Type AP-7 motor starter units, mechanically interlocked so that either unit cannot be closed if the other is closed, the Type AP-7-R reversing motor starters are suitable for 7½ hp., 550 volts, motors or smaller. Units are equipped with "Ruptors," which consist of chambers that confine and depotentiate the arc formed by circuit interruption.



Starters, "Ruptor"

Allis-Chalmers Mfg. Co., Condit Works, Boston, Mass. (Vol. 81,p.468.)

Type AP-7 across-the-line motors starters are equipped with inclosing chambers which

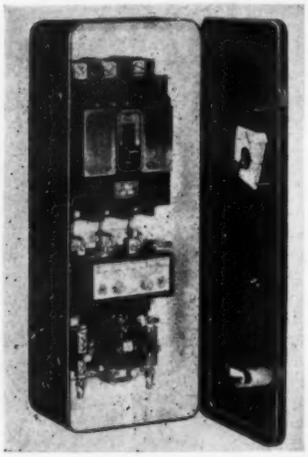


confine and depotentiate the arc formed by circuit-interruption. These starters are furnished for 7½ hp. at 440 and 550 volts, 5 hp. at 220 volts, and 3 hp. at 110 volts.

Switch, Starting, Combination

Allen-Bradley Co., 1311 S. First St., Milwaukee, Wis. (Vol.81,p.1296.)

Bulletin 713 combination starters use circuit breakers instead of standard disconnect switches. These units have a maximum rating of 30 hp., 220 volts; 50 hp., 440-550 volts.

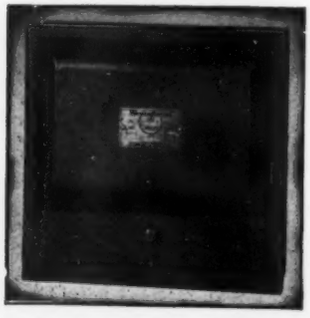


Starter can be tripped open or closed in the same manner as an ordinary disconnect switch.

Linestarters, "Midget"

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol. 81,p.266.)

A complete line of remote-controlled, reversing and non-reversing magnetic starters for

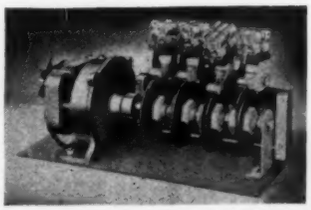


small single-phase and poly-phase, squirrel-cage induction motors has been announced. Contactors are available for ½ hp., 110 volts or 1 hp. 220 volts, single pole or two pole, single phase.

Controllers, Time-Cycle

Electric Switch Corp., Columbus, Ind. (Vol.81,p.24.)

Two general types of time cycle controllers, using Staley metallic mercury switches, have been designed for sequence control of electrically operated machines. These switches are supplied in 5, 10 and 15 amp. capacity. The Model 6611 controller operates one or two circuits at the rate of 15, 30, 45 or 60 circuit makes and breaks per min., the timing sequence and time of circuit operation being accurately adjustable by



means of cams. Model 602 is available with speeds ranging from 1/11 to 60 makes and breaks per min.

Controller, Lifting-Magnet

Electric Controller & Mfg. Co., 2695 E. 79th St., Cleveland, Ohio. (Vol.81,p.718.)

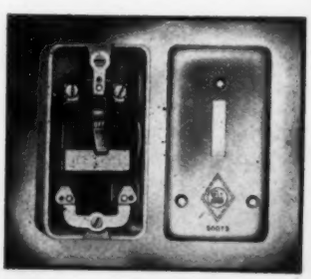
To provide a quick release of load on magnets of all sizes and types, a small two-position

master switch reverses the direction of current in the magnet. Magnet is disconnected from the line automatically as the load is released.

Circuit Breaker, "Protectit"

Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. (Vol.81,p. 144.)

The yoke-mounted "Protectit" is designed for assembly in standard metal wall-boxes as well as in special metal cabinets. One type is a fixed capacity circuit breaker, made in ten different size ratings. Another is an interchangeable heater-element type for which there are 20 heater elements, all with different ratings. Both

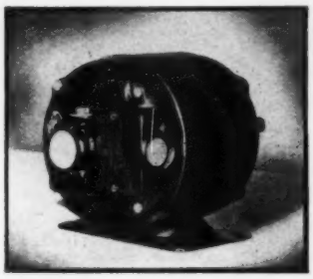


have a maximum rating of 250 volts a.c. or d.c. and a maximum rating of 1 hp.

Switch, Overload, "Thermo-Tector"

General Electric Co., Schenectady, N. Y. (Vol.81,p.220.)

"Thermo-Tector" thermal overload switch for fractional-horsepower motors automatically disconnects motor from line when an overload occurs. Then, when the motor has cooled, it is automatically re-



connected to the line. Switch is available in ratings for a.c. fractional hp. motors, having rated full-load current from 1.3 to 10.4 amp. The switch is arranged for convenient mounting on the conduit or terminal box of the motor.

A form of the switch is available which can be used to disconnect the motor from the line and leave it disconnected until the device is manually reset. This style is suitable for applications where the automatic reset feature is not desired.

Pushbutton Station, "Mushroom"

General Electric Co., Schenectady, N. Y. (Vol.81,p.632.)

This pushbutton station with "mushroom" head for the stop position is of the same general construction as the standard heavy-duty pushbutton station. It is a simple matter for the operator to slap the button when conditions require a rapid shut-down of the machine.

The mushroom head is screwed to a metal insert in

the end of the button. This station is suitable where the operator wears heavy gloves.

Switch, Toggle, Slow-Break

Hart Mfg. Co., Hartford, Conn. (Vol.81,p.226.)

The case and toggle of the slow-break toggle-switch are made of molded Bakelite. This twitch uses slow breaking,

heavy silver contacts and is adapted for use with alternating current. It is made in eight two- or three-position types for flush mounting in standard boxes. Capacity is 20 amp. at 250 volts.

Switch, Line-Voltage

National Acme Co., 121 E. 131 St., Cleveland, Ohio. (Vol. 81,p.716.)

Designed for a.c. circuit applications, "Namco" super-sensitive switches are made in rotary, light-contact, oscillating, plunger and push-button

types, of which the push-button type is shown. These switches have been successfully operated at speeds of more than 200 contacts per min. in connection with "Chronolog" operations.

The Allis-Chalmers Mfg. Co. builds standard motors of every type from 1 hp. up . . . also motors for special application.

UNASSAILABLE!

Allis-Chalmers Seal-Clad Motors are the sturdiest motors on the market—bar none. And in addition to their great strength, they can be depended upon, always, because they are unassailed by the weakening and destructive agents that affect other motors. Allis-Chalmers Seal-Clad Motors are unassailed . . . by metallic dust, grit, oil, moisture, chemicals, or by other destructive agents that are present, to some extent, in every plant.

The wound stator of an Allis-Chalmers Seal-Clad Motor receives an impregnating treatment similar to the conventional type of winding. But, in addition, ultimate protection is assured by a Moulded Bakelite Shield, of high dielectric and mechanical strength, which is fitted into a machined slot in the stator frame and sealed into position with a special compound. Thus the coils are completely protected by hard, smooth shields that are impervious to the attacks of damaging agents.

ISN'T THIS UNASSAILABLE ASSURANCE WORTH WHILE . . . PERFECT PERFORMANCE UNDER ALL CONDITIONS, AT NO EXTRA COST?

For further details, write for Bulletin No. 2182

838

MOTOR DIVISION

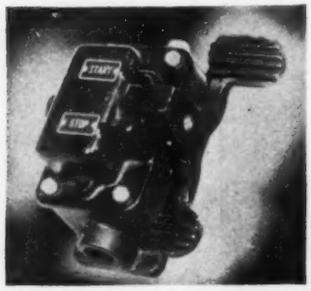
ALLIS-CHALMERS

MILWAUKEE WISCONSIN

Switch, Watertight, Foot-Operated

General Electric Co., Schenectady, N. Y. (Vol.81,p.592.)

This treadle-operated, watertight switch, designated as Type CR2940-2A18, is designed



for installations where the operator must have both hands free while starting or stopping a machine. It is available either with a single- or a double-action treadle.

Pushbutton Station, Illuminated

General Electric Co., Schenectady, N. Y. (Vol. 81,p.812.)

Small, standard-duty, pushbutton stations incorporating

an indicating lamp in the center of the translucent button are available with buttons in six colors: white, green, blue, red, clear and amber. Indicating lamp is operated through a small control transformer.

Pushbutton Station

Monitor Controller Co., Baltimore, Md. (Vol.81,p.594.)

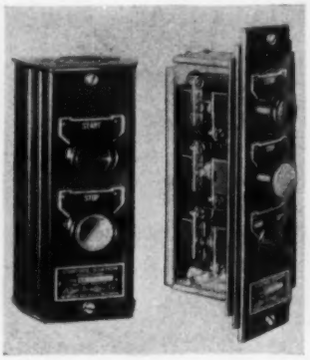
Box and cover of this pushbutton control station are die

cast. Pure silver contacts are mounted on a molded Bakelite base. Wiring connections are made by removing the cover.

Pushbutton Stations

Allen-Bradley Co., 1311 S. First St., Milwaukee, Wis. (Vol.81,p.1239.)

Bulletin 800 heavy-duty pushbutton control stations are available in surface and

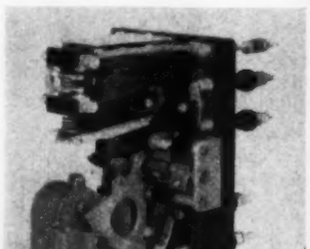


flush mounting types. These units have a maximum d.c. rating of 2.5 amp., 115 volts; 1.25 amp., 230 volts; 0.25 amp., 550 volts. Maximum a.c. rating is 10 amp., 110-220-440-550 volts.

Relay, Definite-Time, Clutch-Type

General Electric Co., Schenectady, N. Y. (Vol.81,p.1056.)

A definite-time relay employing a clutch-type time-delay interlock has been developed to provide a reliable means of timing a sequence of operations in a control system. Available in either a.c. or d.c. forms, with two, four, or six



circuits, the No. CR 2820-1729 relay is adapted for use wherever it is desired to perform several operations in sequence.

The relay consists of a solenoid and a plunger which is mechanically connected to the time delay mechanism and to a shaft which operates the contact fingers. On the d.c. forms a separate small instantaneous cutout switch is mounted on the front of the solenoid. Positive and uniform operation are assured by coil springs which give a constant pull on the timing mechanism.

Relay, Auxiliary, Type "HGA"

General Electric Co., Schenectady, N. Y. (Vol.81,p.23.)

Type "HGA" auxiliary relay can both open and close a circuit and operates on either a.c.

or d.c. It is made in a double pole arrangement, with either two or four contacts. Contacts will make and carry 30 amp. for one minute or 12 amp. continuously.

Contactor, Magnetic, Size 00

General Electric Co., Schenectady, N. Y. (Vol.81,p.469.)

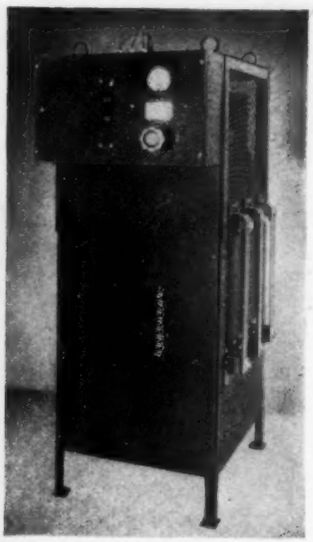
Size 00 a.c. multiple magnetic contactors are designed for controlling small single-phase and polyphase motors, or for use as flexible relaying devices for comprehensive con-

trol systems. This contactor can also be furnished as a magnetic switch for use where atmospheric conditions are normal. The device, used either as a contactor or a magnetic switch, has a maximum rating of 10 amp. at 600 volts.

Rectifier, Plating

Hanson-Van Winkle-Munning Co., Matawan, N. J. (Vol.81, p.344.)

Copper-oxide plate type rectiers provide a practical means of converting a.c. into d.c. for use in electroplating. Each



unit consists of power transformers, a small fan for air circulation, the rectifier unit and necessary control equipment. Six-volt units are offered in capacities up to 10,000 amp.

Rectifier, for Magnetic Chucks

Mellaphone Corp., Rochester, N. Y. (Vol.81,p.804.)

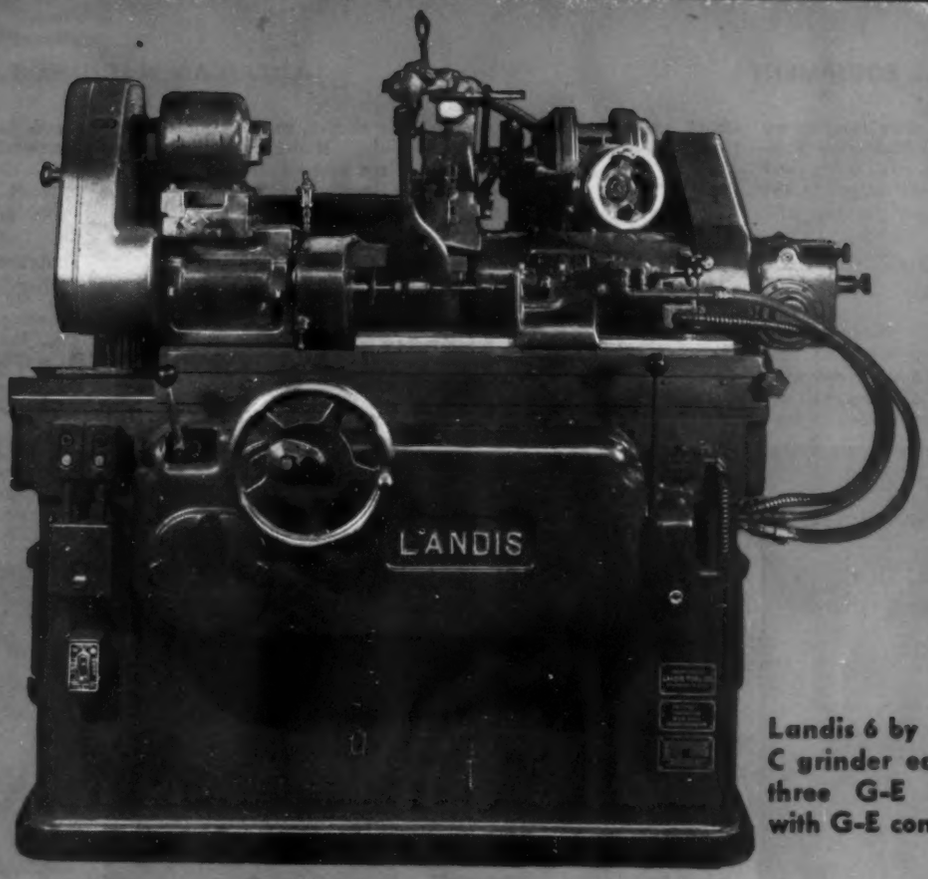
An electronic rectifier using a mercury-vapor tube is designed primarily for supplying d.c. current to magnetic chucks, but can be used for other applications within its

capacity. Models can be supplied to work from either 110 or 220 volts a.c. and deliver 110 or 220 volts d.c. to the magnetic chuck.

Photo-Electric Elements, "Electrocell"

Dr. F. Loewenberg, 10 E. 40th St., New York, N. Y. (Vol. 81,p.632.)

"Eletrocell" is the trade name of a line of self-generating, dry-disk, photo-electric cells which are available in from ⅜ to 2⅝ in. diameter and



Landis 6 by 18 inch Type C grinder equipped with three G-E motors and with G-E control

ARE YOUR MACHINE TOOLS FIGHTING A LOSING BATTLE?

YOUR machine tools may be fighting a losing battle as a result of the advance in design and other improvements in modern machines. Old types can't compete with the modern ones, because of the greater speed and precision of the new machines.

You may find that replacement of many of your present machines will materially add to your profits, because new machine tools like the Landis grinder above increase production and minimize scrap loss to such an extent that old ones cannot profitably compete with them.

SPECIFY GENERAL ELECTRIC

In your machine-tool replacement program, specify General Electric motors and control. You will obtain not only the proper motor and control for your specific requirements, but also the advantages offered by conveniently located G-E service shops equipped for service on all electric apparatus.

You can rely on General Electric to co-ordinate completely your electric equipment and to assume undivided responsibility for its operation. General Electric, Schenectady, New York.

INVENTORY **NOW** THE SAVINGS YOU CAN MAKE WITH MODERN MACHINE TOOLS POWERED WITH G-E EQUIPMENT

DESIGN FOR BETTER LIVING

Machine tools have materially bettered American standards of living. By lowering costs and increasing production, they have raised the level of purchasing power. In this way, they have enabled millions of Americans to have conveniences unknown even to the wealthy of a century ago.

GENERAL ELECTRIC

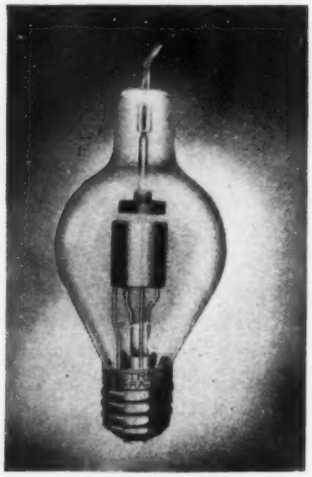
011-287

in rectangular sizes ranging up to 1½ to 2 in. Maximum voltage created is 0.6 volts and maximum current output is 480 microamperes per lumen.

Tubes, Rectifier, Mercury-Vapor

Continental Electric Co., Geneva, Ill. (Vol.81,p.718.)

Type 2-RA-15 mercury-vapor rectifier tubes are designed for low-voltage applications, such



as arc welders. Specifications: filament voltage, 2.5 volts; filament current, 16 amp.; d.c. output, average, 15 amp.; d.c. output, crest, 45 amp.; d.c. output voltage, maximum 60 volts.

Photo-Electric Cell, Type CE-868

Continental Electric Co., Geneva, Ill. (Vol.81,p.467.)

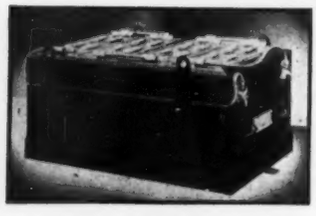
Type CE-868 photo-cell for industrial applications is 1 in. wide by 3$\frac{3}{32}$ in. high and the active cathode surface measures $\frac{3}{8}$x1$\frac{1}{2}$ in. A standard 4-prong base is used. Operating voltage is 90 volts and average output is 50 to 80 microamperes per lumen.

Battery, Industrial, "Durapak"

USL Battery Corp., Niagara Falls, N. Y. (Vol.81,p.633.)

"USL Durapak" storage batteries, designed for use in industrial trucks, electric locomotives and railroad-car lighting and air-conditioning service, use "Permatex" all-rubber separators to balance the long service life claimed for the positive plates.

The positive plate is of sectional construction to with-

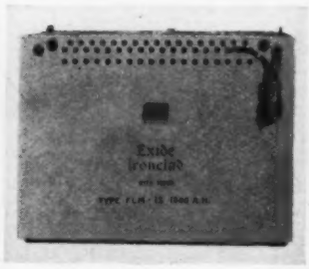


stand expansion and contraction stresses. It has a heavy one-piece interlocking-plate grid for increased strength and conductivity. Plates are machine pasted for uniformity and glass-fiber retainer pads are used to prevent loss of plate material.

Battery, "Ironclad"

Electric Storage Battery Co., Allegheny Ave. & 19th St., Philadelphia, Pa. (Vol.81,p.1058.)

Designed especially for heavy-duty, electric industrial truck service, the super-type FLM-13 Exide-Ironclad storage battery



has a capacity of 1,080-amp.hr. at the normal six-hour discharge rate. It is a 16-cell battery assembled in a steel tray which occupies a 26x51-in space. The unit is 37½ in. high and weighs approximately 2½ tons.

When used in double shift service, the steel tray assembly permits quick exchanges and continuous services through the use of duplicate batteries. The steel tray can be rolled or lifted from the truck when one battery is discharged and a freshly charged battery can be installed in its place.

Solenoids, A.C.

Kingsbury Machine Tool Corp., Keene, N. H. (Vol.81,p.758.)

Model 150-1 and Model 32-269 a.c. solenoids, originally perfected for use with drilling heads, have been made avail-

able to manufacturers of other machinery. Coil is rigidly mounted in a steel case and construction is such that the character of the pull-curve can be made to meet individual requirements.

Model 150–1 has terminal towers molded integral with the coil bobbin flanges. The case, pole piece and plunger are made of low-carbon steel bar slotted to reduce eddy currents. Model 32–269 has lead wires instead of terminals and is more compact. In both models a magnetically shielded helical return spring is used.

Regulators, Voltage, Electronic

Ward Leonard Electric Co., Mount Vernon, N. Y. (Vol.81, p.633.)

These two automatic electronic alternator voltage regulators contain no moving parts. A stream of electrons controls and regulates action. Corrective action of Type 5601 regulators

starts within one-half cycle of a change in generator voltage; Type 5602 regulators start within one cycle.

Heater, "Strip"

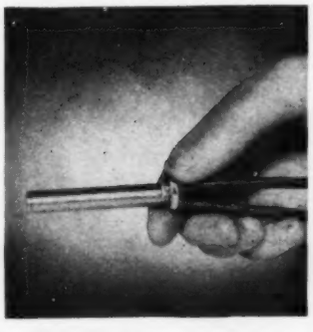
General Electric Co., Schenectady, N. Y. (Vol.81,p.634.)

Offset terminals on this strip heater are claimed to facilitate wiring and arrangement in series. These units, which are similar in construction to standard strip heaters, are available in convenient lengths and ratings.

Heating Unit, Cartridge-Type

General Electric Co., Schenectady, N. Y. (Vol.81,p.757.)

This small cartridge-type heating unit is designed for providing a spot of heat within a limited space. Unit is only ¾ in. in diameter and is of-

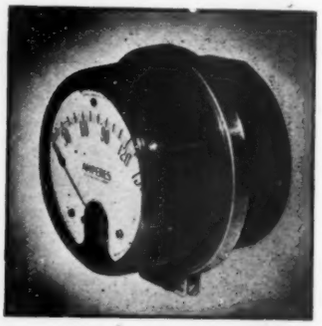


fered for maximum operating temperature of 750 F. It is available in ratings of 30, 75, and 90 watts at 115 or 230 volts, a.c. or d.c.

Instruments, Detachable, "Plug-In"

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol. 81,p.470.)

Sockets for detachable instruments may be cut into the conduit or grouped in standard metal boxes to constitute a panel assembly. Detachable instruments consist of a socket or mounting device which is provided with electrical con-



nection jaws. The instrument mechanism is mounted on a plate having electrical connection blades on the back and inclosed in a waterproof housing of glass.

Cable, Industrial, "Flamenol"

General Electric Co., Schenectady, N. Y. (Vol.81,p.715.)

An industrial cable insulated with a synthetic compound known as "Flamenol." This compound contains no rubber and is noncombustible. Claimed to be highly resistant to moisture, acids, alkalies and oils. Cable insulated with this material is recommended for power and control circuits at 600 volts and less.

X-Ray Unit, Portable

St. John X-Ray Service, Inc., 30-20 Thomson Ave., Long Island City, N. Y. (Vol.81,p. 590.)

Suitable for either shop or field work, this portable X-ray machine has sufficient power to penetrate 3 in. of steel in a one-minute exposure. Unit is mounted on a trailer chassis and the trailer cover may be used as a field dark-room.

The Tearful Tale of Mustapha Mazda

AND it came to pass in the month of Ramdam that Letsera Bray, sultan of Bananastan, spake thus unto his trusty pshaw, Mustapha Mazda, "Arise and go now unto the royal wine cellar at Popgulp. Make haste and bring unto thy sultan a skin full of giggle water so that my august augustness, my harem, and my court may tipple and rejoice."

So Mustapha Mazda salaamed, bestrode the sultan's trusty camel, Cellophane, and departed fresh. Upon the third day he came to Popgulp and did get the skin full of giggle water. But there was much heat in that country, and the skin, unlike its contents, waxed weaker with age, until lo! it sprang a leak. Forthwith did Mazda seek out the local taxidermist for a new giggle container.

Now it chanced that in stock the taxidermist did carry a fine new skin priced at five ninety-eight. But he permitted Mazda to buy for his skin a patch for two bits and to save the difference.

Again did another leak appear in the skin, and again Mazda, seeing not the light, bought a patch. Again and again, a score and two times, did other leaks befall, and yet did not Mazda see the light. At first he did buy patches for the skin to save the old skin, then did he buy him more patches to save the first patches. He did waste so much time and spill so much giggle water that even the wayside Sphinxes did giggle.

So it was that when Mustapha Mazda did finally stand before the sultan, Letsera Bray was most wroth. "Verily must I know why thou didst take twice seven days to make a seven-day journey, even when thou didst bestride my freshest camel, Cellophane! Why comest thou before me bearing a bundle of patches? Again, where is the giggle water?"

Then did Mustapha Mazda salaam thrice thirteen times, seeing the light not even yet, saying, "Fifty hails and seventy-five hozannas, my master. By careful shopping and myself sewing on the patches, I did save thee forty-eight cents."

Too much was this for Letsera Bray. Thrice did he smite his chest. "Die, son of an owl. Knowest thou not that the prophet has said, 'It is better to replace than to repair'?"

Then, and then only, did Mustapha Mazda see the light, but lo! it promptly faded. Letsera Bray saw to that.

Published first as an editorial in American Machinist for Aug. 27, 1931, and thereafter widely reprinted, this parable still makes a point particularly pertinent to this Annual Buyer's Reference Number

AMERICAN MACHINIST

Performance-

● The Link-Belt line of anti-friction and babbitted bearing power transmission units is daily proving its reliability to critical users.

Inbuilt values, built and backed by Link-Belt, are demonstrating their worth in actual ***performance.*** Send for General Catalog No. 700.

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LINK-BELT
Power Transmission Equipment Includes:

Mounted Anti-Friction Bearings
Babbitted Bearings
Hangers, Take-Ups, Collars
Rigid and Flexible Couplings
Jaw and Friction Clutches
Steel and Cast Iron Pulleys
Cut and Cast Tooth Gears, etc.
Silverstreak Silent Chain Drives
Silverlink Roller Chain Drives
Speed Reducers of the Worm, Herringbone and Motorized Helical Gear Types
Variable Speed Transmissions of the P. I. V. and V. R. D. Types

LINK-BELT

Power Transmission Equipment
- the Line that includes Positive Drives

Power Transmission

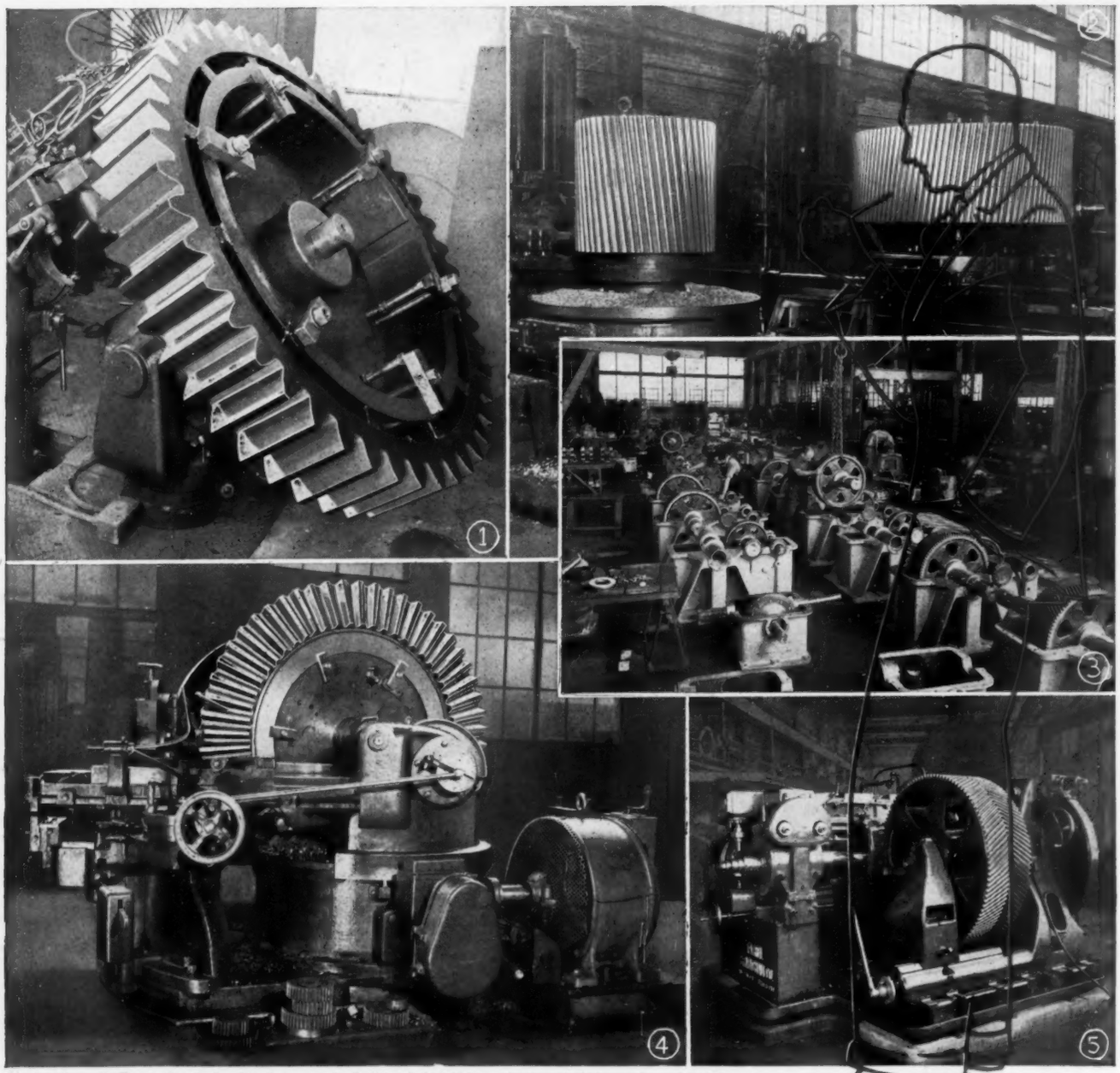
ECONOMIC application of power to manufacturing equipment necessitates consideration of available methods as well as the power requirements of the driven units. Drive methods are being improved continually and all have their place in industry. Present-day requirements for uninterrupted, low-cost production demand careful power-application engineering.

More than 20 sizes of radial-piston hydraulic pumps and motors are included in an improved line of "Fluid Power" units which include variable- and constant-displacement machines. These 20 units are available in three series, with working pressures of 1,100, 1,700 and 2,500 lbs. per sq.in., respectively.

Finger-tip actuation of a small lever is said to provide stepless variation of hydraulic power from the pumps of this line. In the pump-motor combinations, power input of the pump is proportional to the speed and torque demand of the motor. Features claimed for these motors are stepless, infinitely variable speed in either direction with smooth, uniform acceleration and deceleration.

Various control units have been made available for variable speed units of the mechanical type. One of these consists of a special cam follower which actuates the control shaft of the variable speed unit; another is a differential unit suitable for synchronizing two or more machines or parts of the same machine.

Roller-bearing pillow blocks have been materially improved during the past year and several rubber-mounted units are available. Several new flexible couplings and improved clutches also are offered. A fiber lagging is offered to increase the diameter of pulleys and flywheels, thus permitting a change of speed of belt-driven units without replacing any pulleys. This lagging is designed to present a compressed end-grain fiber surface to the belt and is claimed to grip and pull the belt without slip.



Photos show: 1. Flame Hardening Equipment. 2. Cutting Spiral Gears. 3. Speed Reducer Assembly Department. 4. Planing large Bevel Gear. 5. One of our Sykes Gear Cutting Machines.

. . . and the "Invisible Man" is *you!*

Never seen . . . but always the boss, in our plant. For we regard our organization as *your gear department*, and *your* interests are always our first consideration.

Here, at Philadelphia, we maintain one of the largest plants of its kind . . . employing a corps of skilled workers—experts in gear making . . . and filled with thousands of dollars worth of the most modern equipment available. As a result, we are able to supply you with the finest, most accurate power transmission devices . . . as well as to give you the same, or better service than your own gear department—without the burden of its overhead.

When you need gears . . . think of Philadelphia! We supply gears of any type—in every size—in any quantity.

PHILADELPHIA

Products

PHILADELPHIA GEAR WORKS

Industrial Gears and Speed Reducers

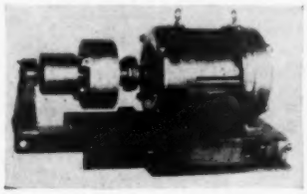
ERIE AVENUE & "G" STREET, PHILADELPHIA, PA.

Machine Drives, Transmissions and Reducers—Hydraulic Pumps and Motors—Clutches, Couplings, Pillow Blocks, and Pulleys—Belts, Connectors and Dressings

Drive Unit, Motor, Eight-Speed

Production Equipment Co., 5219 Chester Ave., Cleveland, Ohio. (Vol.81,p.872.)

This special drive, consisting of a four-speed motor and an auxiliary gear reduction unit, is normally used on single-pulley drive applications and the driving pulley, mounted on the extended shaft to the left

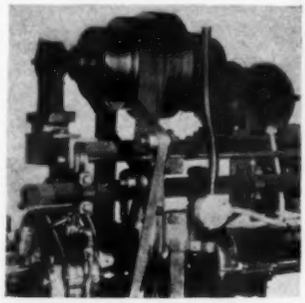


of the gear unit, is designed to operate at either the motor speed or the gear reduction speed. Units are available in ratings up to 5 hp., with speed ranges up to and including 24 to 1.

Drive, Countershaft, Oil-Pump

Production Equipment Co., 5219 Chester Ave., Cleveland, Ohio. (Vol.81,p.871.)

Operation of an auxiliary oil pump is possible by a standard idler-pulley unit designed for use in connection with the Type



844 motorized countershaft. An arm carrying two ball-bearings-mounted idler pulleys is attached to the vertical support column of the motorized countershaft.

Transmission, V-Belt, Variable Speed

Speedmaster Co., 1301 Washington Ave South, Minneapolis, Minn. (Vol.81,p.1238.)

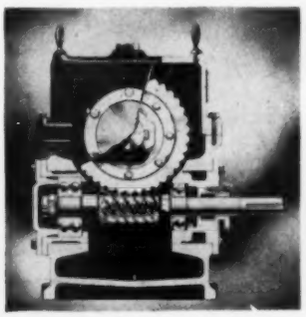
Employing standard V-belts which run over adjustable Bakelite pulleys, this transmission unit automatically maintains alignment between the pulleys and the belt. In the unit illustrated, the output

shaft runs at 90 r.p.m. at the slow speed and at 4,300 r.p.m. at the high speed.

Reducer, Speed

Foote Bros, Gear & Machine Corp., 215 N. Curtis St., Chicago, Ill. (Vol.81,p.384.)

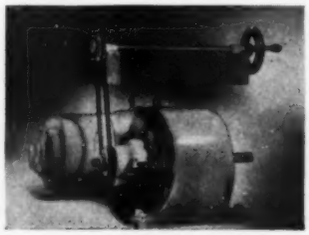
Size No. 7-HG has been added to the line of worm gear speed reducers. This reducer has a center distance of 7¼ in. with ratios of 3¾ to 1 up to 2,450 to 1. Horsepower ratings range from ½ to 27½.

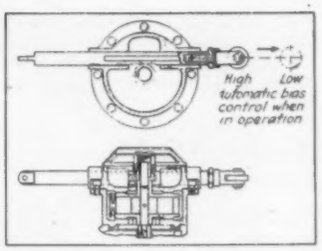


Control, Remote, Varidrive

U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles, Calif. (Vol.81,p.145.)

Bearing supports, shafting, sprockets and chains have been standardized to obtain remote mechanical control of variable speeds when used in connection with the U. S. Varidrive motor. Speed control is positive as there is no slippage.





Control, Transitorq, Cam-Operated

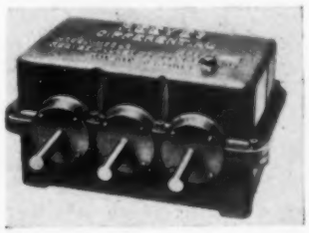
New Departure Mfg. Co., Bristol, Conn. (Vol.81,p.145.)

Where a cam can be used for speed control purposes, this unit is mounted on the Transitorq and the follower arm is held against the face of the cam by spring pressure.

Control, Variable-Speed

Reeves Pulley Co., Columbus, Ind. (Vol.81,p.1052.)

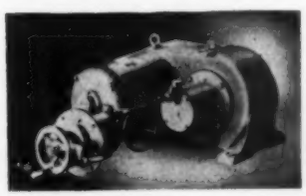
Listed as Model MDB-3, this differential control for variable-speed transmission service is offered for use in automatic speed control. By turning the speed control handwheel on the transmission, the center shaft may be adjusted to any speed in either direction, including zero r.p.m.



Control, Remote

U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles, Calif. (Vol.81,p.302.)

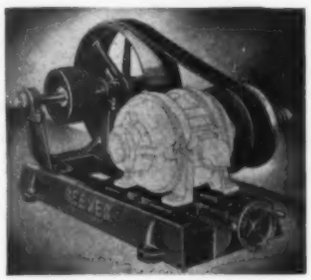
A hydraulic remote-control has been made available for the "Varidrive" motor. With this control the operator can vary the speed of the unit over a wide range.



Pulley, Motor, "Vari-Speed"

Reeves Pulley Co., Columbus, Ind. (Vol.81,p.756.)

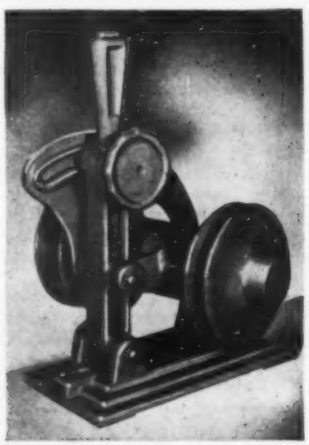
Design of the countershaft-type "Vari-Speed" motor pulley has been improved by mounting the pulley on the countershaft between the two bearing housings. Through handwheel control, a sliding base on which the motor and unit are mounted is moved forward or back, varying the diameters of a set of adjustable disks from which a V-belt runs to the driven pulley.



Control, Vari-Speed

Columbia Vari-Speed Co., Wheaton, Ill. (Vol.81,p.468.)

"Hi-Eff" Vari-Speed control transmission consists of a single shaft on which are mounted two adjustable V-belt pulleys. These pulleys vary in diameter

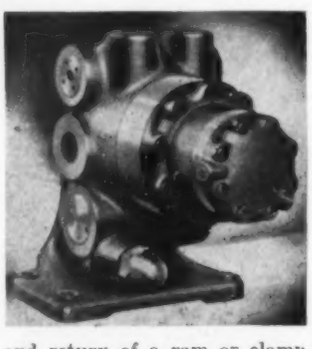


as their distances from the driving and driven pulley are changed. Infinite speed selectivity within ratios of 5 to 1, and sizes from ¼ to 7½ hp. are available.

Hydraulic Pump

Sundstrand Machine Tool Co., Harrison & 11th Sts., Rockford, Ill. (Vol.81,p.466.)

Model WX pump units are designed for arbor presses, clamping fixtures, indexing devices, clutches and brakes. Quick action for the approach



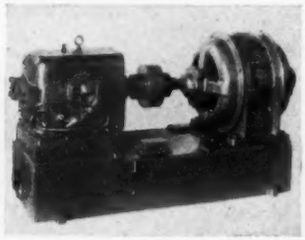
and return of a ram or clamping member is taken care of by a large capacity "Rota-Roll"

pump with a small-sized pump of the same type producing the clamping or working pressure.

Hydraulic Units

Oilgear Co., 1319 W. Bruce St., Milwaukee, Wis. (Vol.81,p. 1114.)

"Fluid Power" variable- and constant-displacement pumps and motors have been redesigned to simplify their construction. More than 20 sizes of radial-piston pumps and motors are



available for pressures up to 3,000 lb. per sq.in. each with compact, interchangeable control devices. Three series of pumps and motors, with working pressures of 1,100, 1,700 and 2,500 lb. per sq.in., respectively, are available.

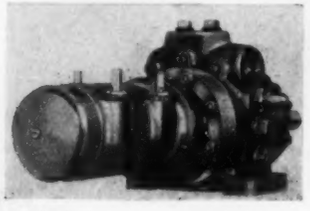
A Type DH-6017 two-way variable displacement pump with a direct-connected electric motor drive mounted on a common base is shown above. This pump unit is equipped with a hydraulic Servo-motor lever control.

A Type C "Fluid Power" motor is shown below. These motors are of the constant-torque type, maximum torque being available at all speeds.

Hydraulic Units, Pumps, Model PWX

Sundstrand Machine Tool Co., Harrison & 11th Sts., Rockford, Ill. (Vol.81,p.806.)

This line of hydraulic pump units, having control valves built into the pump housing, are made in two sizes, the larger being the Model 10PWX and the smaller the Model 5PWX. Variable-displacement piston pump in the 10PWX



unit can be furnished with three different feed rates: fast, medium and slow feed, each of which is independently adjustable.

Hydraulic Units, Motor, 1-Hp.

Sundstrand Machine Tool Co., Harrison & 11th Sts., Rockford, Ill. (Vol.81,p.302.)

The first unit of a line of fluid motors of the multiple-piston type has a rating of 1 hp. at 900 r.p.m. It is suitable for speeds as low as 20 r.p.m., and it can be reversed instantly while running at speeds as high as 3,000 r.p.m.

Bearing, Pillow Block, Special

Fafnir Bearing Co., New Britain, Conn. (Vol.81,p.28.)

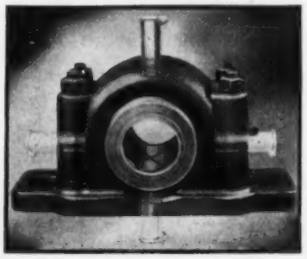
This special, roller-bearing pillow block is designed for service involving heavy end-

thrust in addition to radial load. A spherical housing construction provides for self-alignment. These pillow blocks are available for shaft sizes ranging from $3\frac{5}{16}$ to 10 in. and with radial load capacities up to 250 tons.

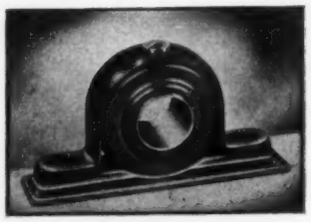
Bearing, Pillow Block, Universal

Randall Graphite Products Corp., 609-613 W. Lake St., Chicago, Ill. (Vol.81,p.185.)

This universal, double-reservoir, oil-return pillow block can be mounted in any position ac-



cording to the requirements of the individual installation. Oil placed in the upper reservoir feeds to the shaft, as needed, through graphite feed plugs and graphite pressure-packed channels.



Bearing, Cushioned, Bronzoil

Dodge Mfg. Corp., Mishawaka, Ind. (Vol.81,p.592.)

Cushioned bronzoil bearings have a thick band of durable synthetic rubber which cushions vibration and absorbs sounds developed by rotating parts. This band, which incloses the inner unit, is oil-proof.

Seals, Auxiliary Cap, Pillow Block

Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill. (Vol.81,p.226.)

Auxiliary cap seals for standard pillow blocks are intended for use in exceptionally dusty and dirty operating conditions. These seals are available in two types, open end and closed end, in a full range of sizes to fit standard duty roller bearing pillow blocks.

Bearing, Pillow Blocks, Type RS

Fafnir Bearings Co., New Britain, Conn. (Vol.81,p.676.)

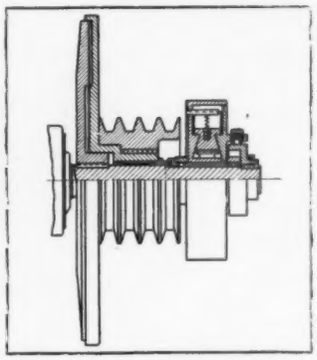
The addition of a wide inner-ring ball bearing with self-locking collar to a rubber pillow-

block permits easy installation of the Type RS pillow block. Built to inch rather than metric dimensions, the bearings fit standard shafts without machining. Range is from $\frac{1}{2}$- to $1\frac{7}{16}$ in. bore.

Clutch Adjustable, Automatic

Dickson Automatic Clutch Co., 606 S. Hill St., Los Angeles, Calif. (Vol.81,p.633.)

Consisting of three principal parts, this adjustable automatic clutch will operate equally well in either direction of rotation. A simple adjustment regulates the time-lag,

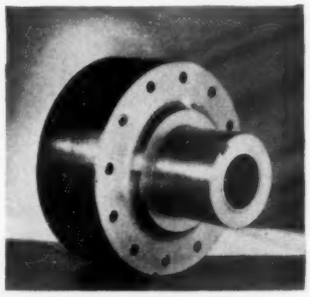


which permits the motor to obtain full speed before load is applied. Clutch is non-locking, releasing at once when the speed drops below the critical point. Sizes range from $\frac{1}{20}$ to 350 hp., for speeds from 600 to 3,600 r.p.m.

Clutch, Over-Running

Hilliard Corp., 102 W. 4th St., Elmira, N. Y. (Vol.81,p.801.)

Design of the over-running clutch has been improved so that each roll is now controlled

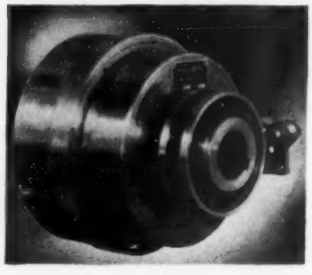


by individual springs. This is claimed to reduce backlash and to insure smooth and instantaneous engagement. Capacity range is from 1.3 to 340 hp. at 100 r.p.m.

Clutch, Magnetic

Stearns Magnetic Mfg. Co., Milwaukee, Wis. (Vol.81,p.383.)

Style E magnetic clutch is of compact design and is recommended for dry or wet applications. It is claimed to be

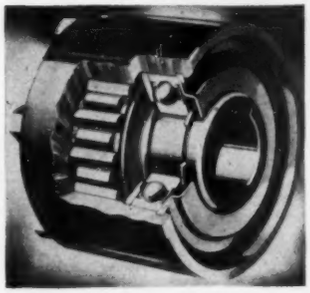


particularly suitable for machine tools and similar applications. Automatic self-alignment is claimed.

Clutch, Free-Wheeling

Morse Chain Co. Div., Borg-Warner Corp., Ithaca, N. Y. (Vol.81,p.345.)

This high-torque, indexing

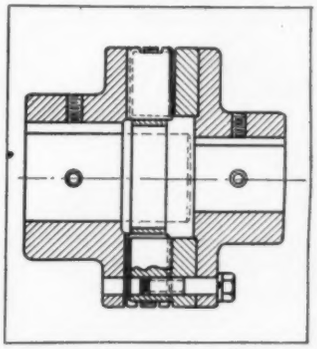


and free-wheeling clutch, designed to fill the need for a simple clutch to transmit power in one direction, is claimed to have features that ensure smooth, positive cam action and eliminate ratchet noise and backlash.

Coupling, Flexible, Type WQ

Lovejoy Flexible Coupling Co., 4956 W. Lake St., Chicago, Ill. (Vol.81,p.1060.)

One set of jaws, made in the form of a removable ring, is used in the L-R Type WQ flex-



ible coupling. Cushions float between the metal jaws and no lubrication is necessary. Standard sizes have bores ranging from 1½ to 14 in. and capacities from 2 to 2,000 hp. at 100 r.p.m. Three types of cushions are used.

Coupling, Flexible, "Full-Floating"

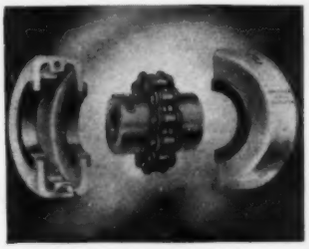
T. L. Smith Co., 2801 N. 32nd St., Milwaukee, Wis. (Vol.81, p.758.)

Improvements in the Rybeck "Full-Floating" flexible coupling include laminated springs which replace ring shaped springs for transmitting the torsional loads. Horsepower rating at 100 r.p.m. ranges from 0.9 to 130 hp.

Coupling and Cover, Flexible

Whitney Chain & Mfg. Co., Hartford, Conn. (Vol.81,p.145.)

The Whitney roller-chain flexible coupling now has a compact cover designed to give

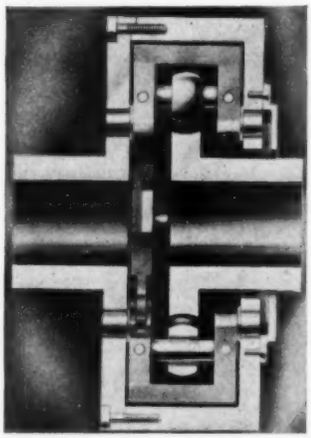


adequate lubrication to the coupling chain and to permit easy removal. These couplings are made in the wide chain design to give maximum chain roll and sprocket tooth bearing area.

Coupling, Flexible, No. 2

Harris Coupling Co., 265 W. 40th St., New York, N. Y. (Vol.81,p.144.)

The No. 2 universal self-aligning shaft coupling allows parallel misalignment of ¼ in., angular misalignment of 20

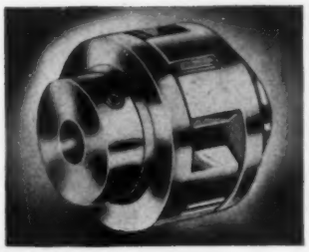


deg. either way and provides for ample end float. Two designs of internal mechanism are available. One type is constructed with the oscillating members held in relative position through gear teeth. The other type is connected with bell cranks.

Coupling, Flexible, All-Steel

John Waldron Corp., New Brunswick, N. J. (Vol.81,p. 468.)

Recommended for use up to ¾ hp. at 1,800 r.p.m., the Francke all-steel, fractional-horsepower flexible coupling can be used for shafts up to ¾-in. diameter. Independent lateral floating of the connected shafts is provided by this coupling. It is claimed to be silent at any speed.



Couplings, Flexible

Boston Gear Works, Inc., N. Quincy, Mass. (Vol.81,p.226.)

Listed as catalog No. FCB-15, these couplings are avail-

able for ½, ⅝ and ¾-in. diameter shafts and are rated at ⅛ hp. capacity at 300 r.p.m.

Lagging, Split

Rockwood Mfg. Co., 2001-1801 English Ave., Indianapolis, Ind. (Vol.81,p.1294.)

Made of the same material as Rockwood pulleys, this fiber lagging is designed to be used to increase the diameter of pulleys and flywheels. A compressed end-grain fiber surface is presented to the belt and is claimed to grip and pull the belt without slip. Furnished in diameters up to 72 in. and in face widths to 18 in.

Wheels, Sheave

Metzger Co., 105 Logan St., S.W., Grand Rapids, Mich. (Vol.81,p.758.)

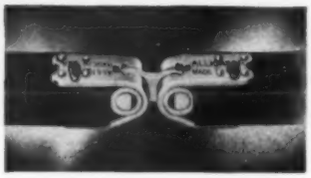
Sheave wheels of end-wood construction, similar to that used in the truck and caster

wheels that have been marketed for a number of years, can be made with hubs for keying to shafts or can be fitted with oil-less end-wood bearings, ball bearings, or roller bearings. These sheaves are made of selected hard maple that has been chemically treated. All sheaves are made up to customer's specifications.

Fastener, V-belt, Flexible, "Alligator"

Flexible Steel Lacing Co., 4607-31 Lexington St., Chicago, Ill. (Vol.81,p.676.)

Designed especially for joining C-section fabric-core V-belts having cross-weave construction, the "Alligator" fast-



eners permit the installation, shortening or replacement of V-belts without the necessity of tearing down installations. Design is such that no metal parts touch the pulleys.

Belt Hooks, Carded, "Wiregrip"

Armstrong-Bray & Co., 308-10 N. Sheldon St., Chicago, Ill. (Vol.81,p.225.)

"Wiregrip" belt hooks are mounted on specially processed cards that hold the hooks firmly, strengthening them and permitting the workmen to easily cut off the desired number of hooks, without destroying or disturbing others.

Applicator, Belt Dressing

Graton & Knight, Worcester, Mass. (Vol.81,p.1060.)

This trigger-action belt dressing applicator is arranged so that two or three trigger

squeezes will apply enough dressing for the average belt. This applicator can be used at some distance from moving units, increasing the safety of the dressing operation.

HOW AND WHERE A Splash Proof MOTOR WILL HELP YOU . . .

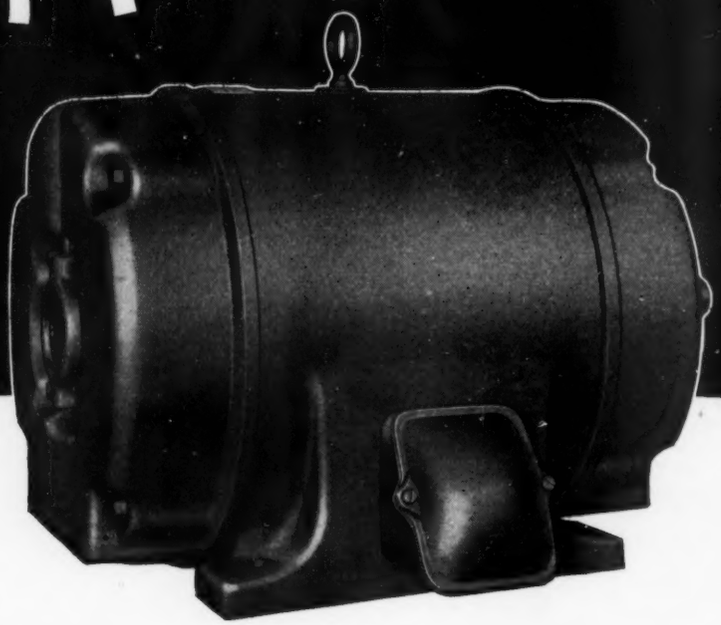


Fig. 1

This Splash-proof motor is designed and built to *protect* the vital internal parts of the motor against splashing and dripping water and falling objects — indoors and outdoors . . . The *cost* of this added protection is *only a little more* than the lesser protection afforded by an open type motor.

NEMA Rule MG50-16, SPLASH-PROOF MACHINE (New), Adopted Standard 8/1/35, reads:

"A splash-proof machine is one in which the ventilating openings are so constructed that drops of liquid or solid particles falling on the machine or coming towards it in a straight line, at any angle not greater than 100 deg. from the vertical, cannot enter the machine either directly or by striking and running along a surface."

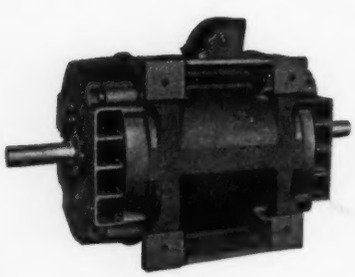


Fig. 2

Fig. 3

Note Figures 1, 2 and 3 . . . Fig. 1 shows the *solid, closed,* frame and cast iron end brackets, which protect the motor against dripping water and falling objects . . . Figs. 2 and 3 show how the openings of the ventilating air passages, and baffles, are located *underneath* — near the feet of the motor . . . This design prevents splashing water getting into the motor, because water entering at this point would have to "travel up hill" to reach the vital motor parts.

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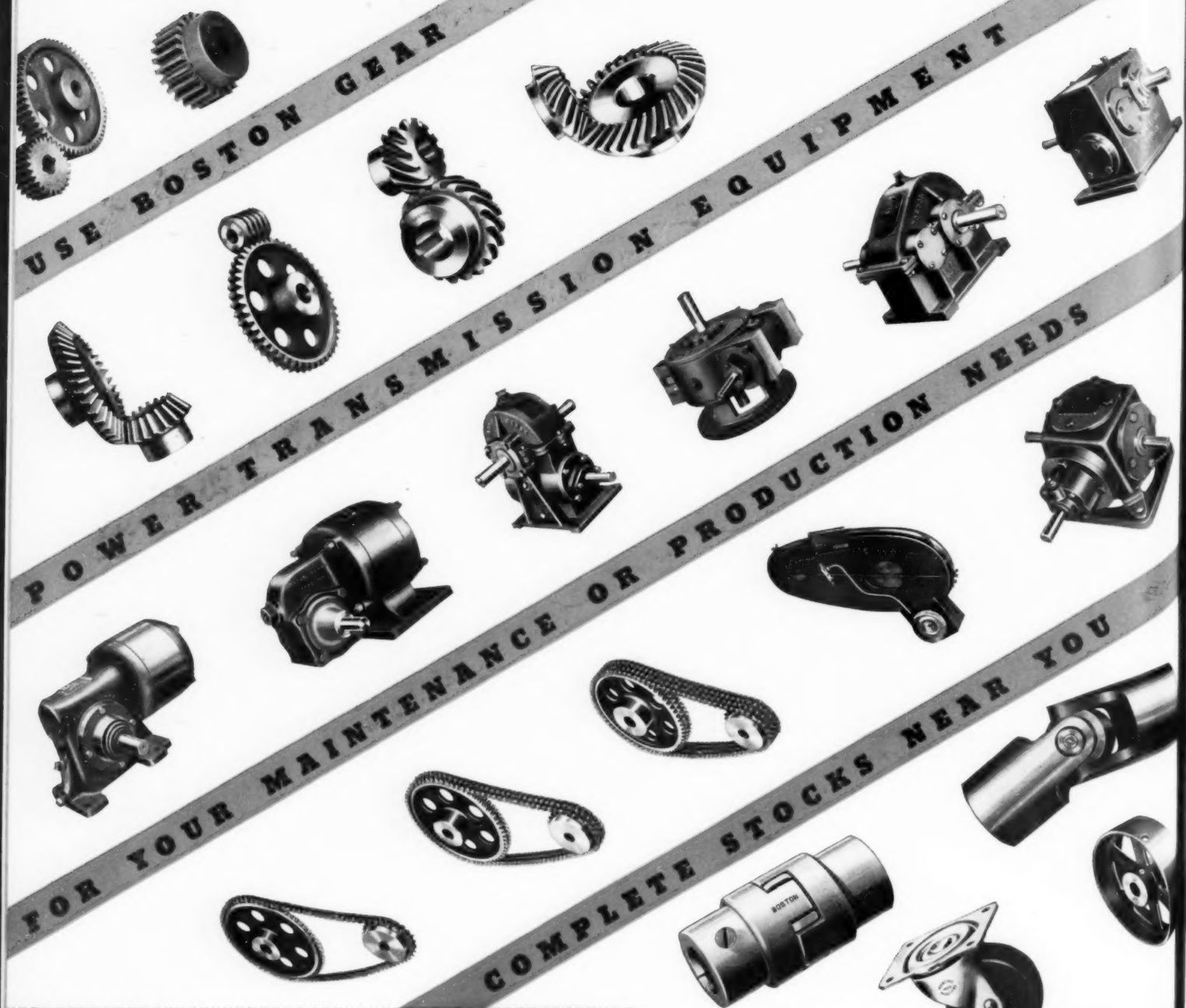

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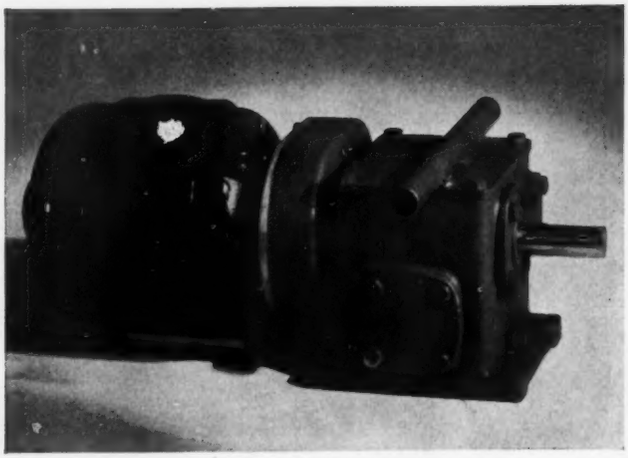
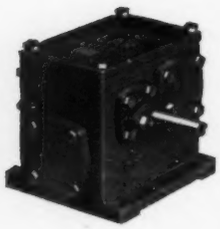


A stock gear box, a small casting and a motor . . .



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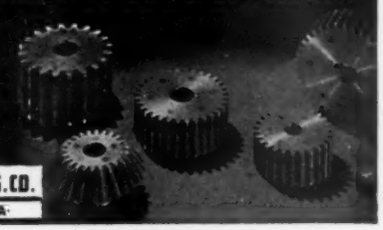

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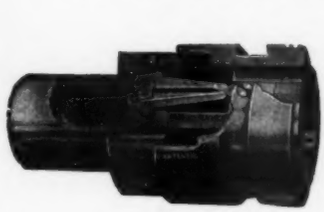
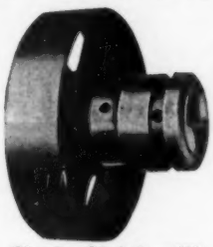


Single Clutch—Showing Working Parts

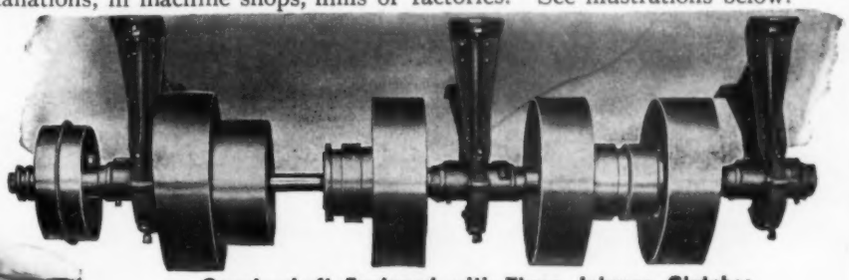


Single Clutch with Pulley

Double Clutch with Pulleys

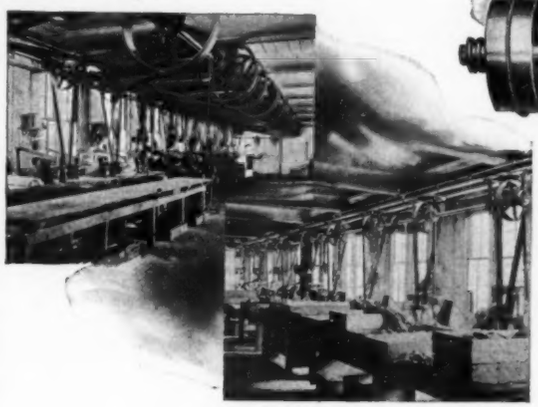
Double Clutch—Exterior

Single type is for driving forward. Double type is for forward and reverse, or for two-speed drive. These are ideal for line shaft or countershaft installations, in machine shops, mills or factories. See illustrations below.



Countershaft Equipped with Three Johnson Clutches

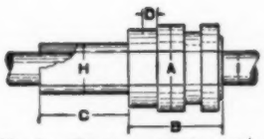
The Old Way



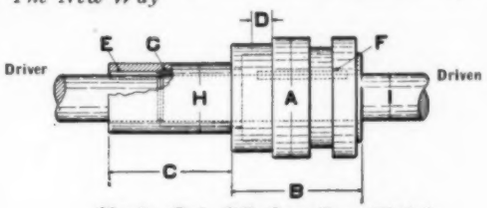
Lineshaft Drive *The New Way*

Johnson Friction Clutches are extremely well adapted to countershaft use. Light in weight, compact, and nicely balanced, they provide a countershaft that operates smoothly, consumes little power, and gives long and continuous service. The illustration above shows three Johnson Clutches mounted with standard pulleys to give two forward speeds, a reverse, and an auxiliary drive.

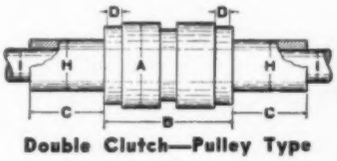
Thousands have been used during the past 30 years as a part of all kinds of machinery, incorporated as a part of the machine.



Single Clutch—Pulley Type



Single Cut Off Coupling Clutch



Double Clutch—Pulley Type

Bores of all hubs Alemite lubricated if possible with excess lubricant led to clutch frictions. Clutch hub ordinarily 1 inch longer than face of pulley used.

Diameter of hub H must be approximately 1 inch larger than shaft diameter. If a bushing of any kind is used in the hub bore, it must be made proportionately larger. The hub length C can be furnished any dimension on special order. Clutches with bushed hubs considered special.

Diameter of standard and bushed clutch hubs ordinarily made to fit standard pulley bores as far as possible.

WRITE FOR BLUE CLUTCH CATALOG NO. 14.

DIMENSIONS OF STANDARD SINGLE AND DOUBLE CLUTCHES

Clutch Size No.	†Clutch Ft. Lbs. Torque Slips At	Dimensions, Inches: I Max. Bore	I Min. Bore	A Max. Diam.	B-Length Clutch Proper Incl. Cups Single	B-Length Clutch Proper Incl. Cups Double	C—Std. Clutch Hub Length	D Throw to Engage Clutch	Weight, Lbs. Single	Weight, Lbs. Double
*00	60	1/4	1/4	2 1/8	2 1/8	3 1/8	1 1/2	5/8	2 1/2	3 1/2
0	150	1 1/16	1/4	3 1/8	3 1/4	5	3	7/8	10	20
2	270	1 1/16	1	4 1/2	4 1/16	6 1/16	4	1 1/4	12	25
4	320	1 1/4	1 1/16	4 5/8	5 1/16	7 1/2	5 1/2	1 1/4	19	32
5	415	1 1/4	1 1/16	5 1/8	5 1/16	8 1/16	6	1 1/4	27	43
6	600	2 1/16	1 1/4	5 1/4	6 1/2	8 1/8	6 1/2	1 1/4	35	54
8OS	855	2 1/4	1 1/4	6 1/4	6 1/4	11 1/2	8 1/2	1 1/4	53	96
8NS	855	2 1/16	1 1/4	6 1/4	5 1/16	8 1/16	6 1/2	1 1/4	38	63
10OS	950	2 1/4	1 1/4	7 1/8	5 1/2	8 1/2	8 1/2	1 1/4	75	110
10NS	950	2 1/4	1 1/4	7 1/8	5 1/16	8 1/16	6 1/2	1 1/4	75	110
11	1305	3 1/16	1 1/4	9 1/16	6 1/8	10 1/16	8 1/2	1 1/16	130	150
13	1500	3 1/4	2 1/16	11 3/4	8 1/16	11 1/8	10	1 1/16	190	280

*Midget type for fractional hp.; made differently from standard type.

†Clutch frictions will slip when load equals the torque noted in this column. Select a size of clutch that has a good factor of safety, of clutch torque, over the foot pounds torque of problem.

OS.—Old Style; exceptionally long in No. 8 size; with light clutch levers in No. 10 size.

NS.—New Style; compact, with heavy clutch levers.

Bores.—Decimal, millimeter, or above maximum or below minimum in table, Columns I, command a special price.

Clutch Hub Lengths.—Column C if different than standard, command a special price.

Clutch Hub Diameters.—If different than standard, command a special price.

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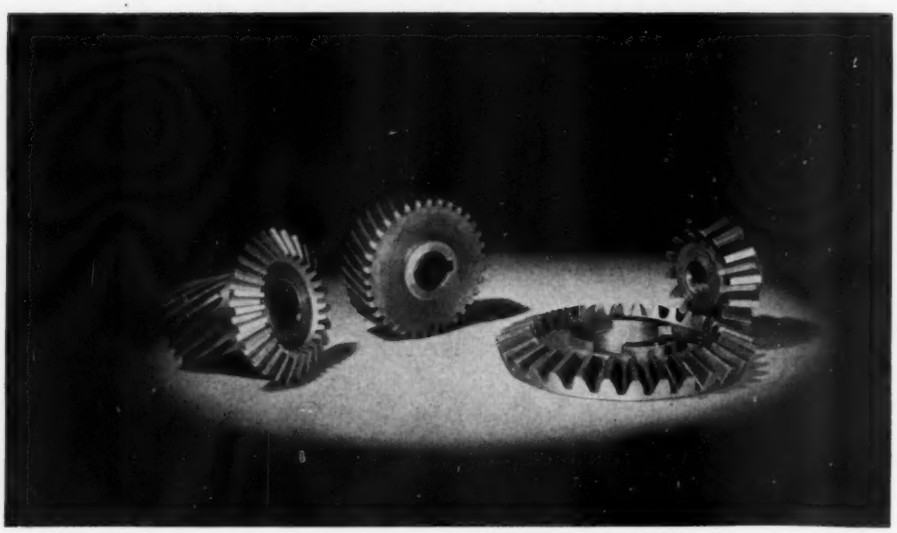

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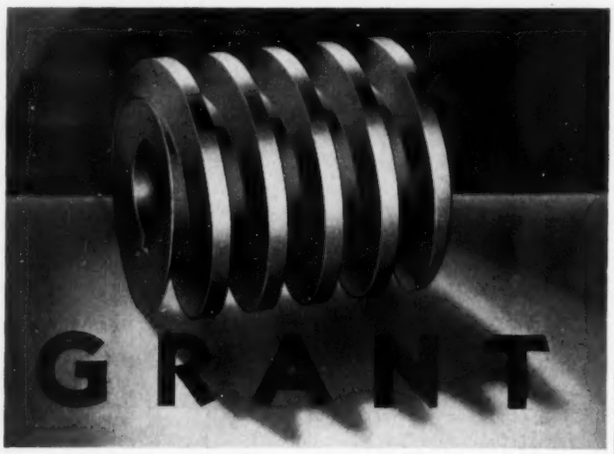

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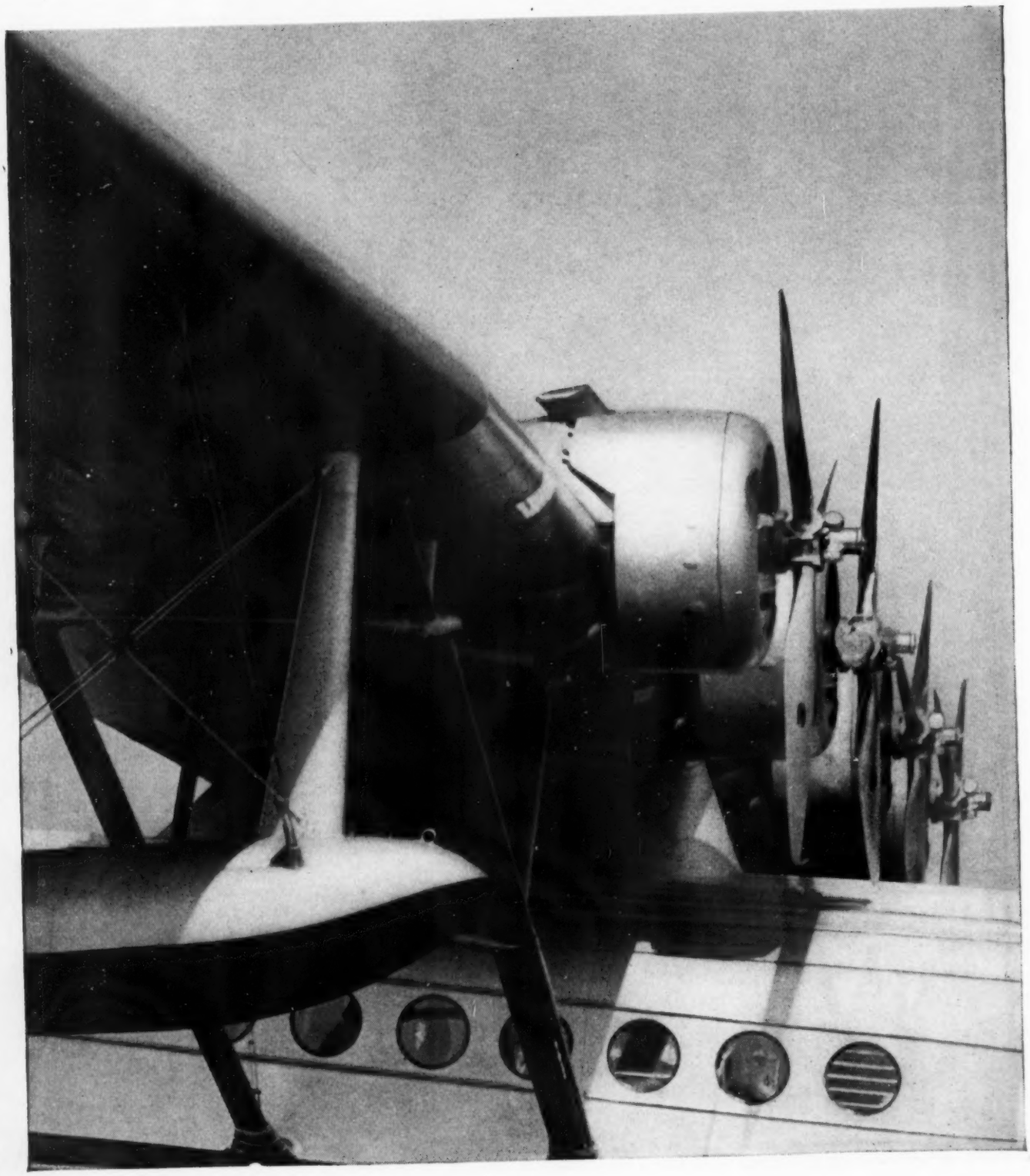

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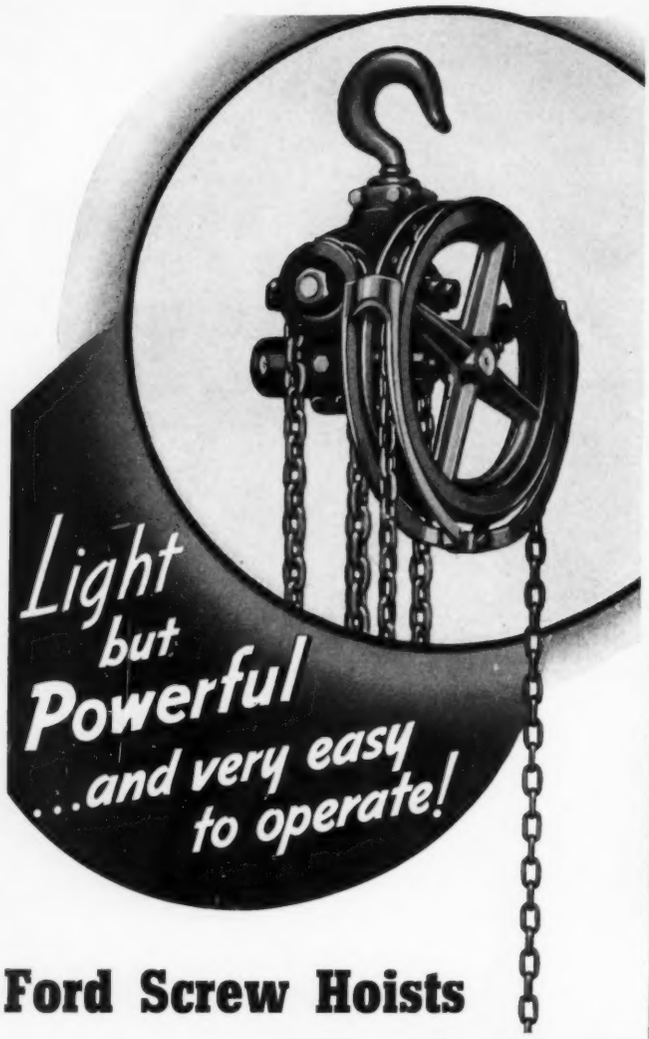

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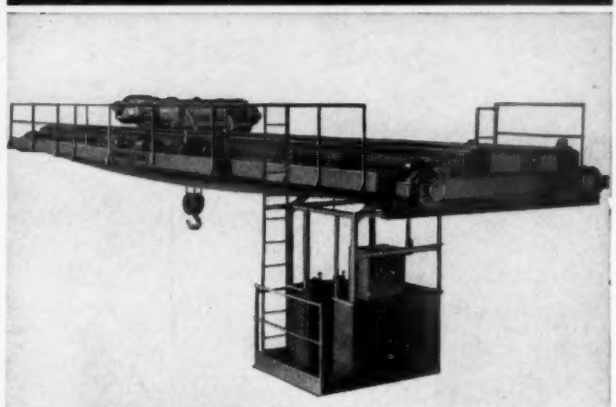

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ONE OF THE major problems of industry is the economic transportation of materials, parts and products in both plant and warehouse. Evidence of the importance of the problem is to be found in the new and improved transportation units that are continually being offered. Standard units are made adaptable to special handling jobs. Dependable methods of transfering parts from operation to operation are available for all types of manufacturing processes.

Load carrying capacity, ease of handling and maneuverability in narrow aisles are features claimed for a number of power and hand-operated industrial trucks and tractors announced during the past year. A 5-ton capacity telescoping tiering truck offered early in the year permits tiering skids to a height of 106 in. above the floor, while retaining an 88-in. nested height, low enough to enter a standard box car.

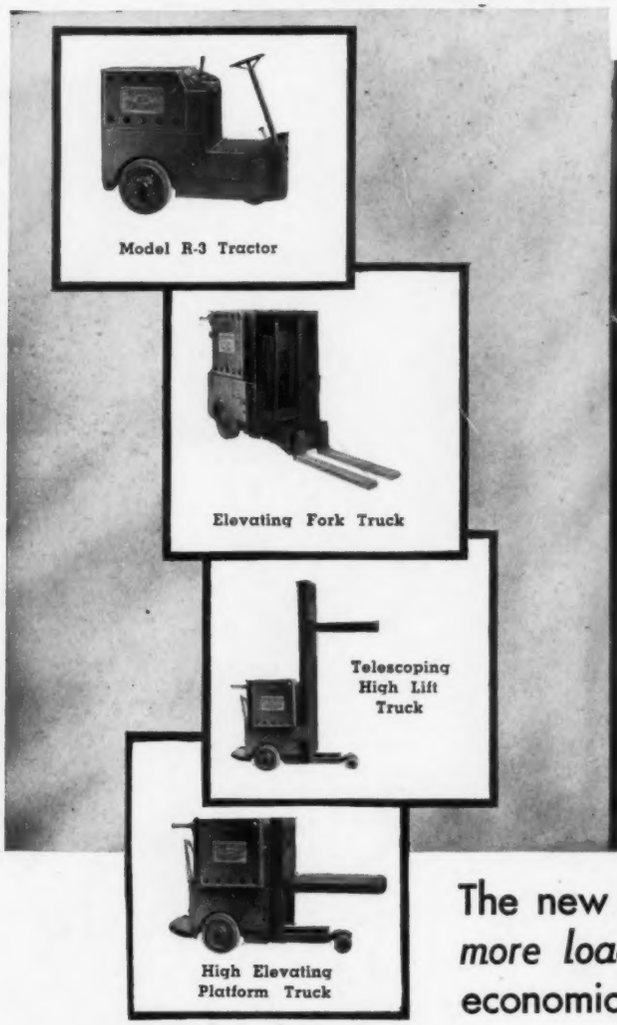
Three speeds in either direction are provided by a snap-action contactor on a low-platform, 2-ton capacity, power truck of the four-wheel steer type. A boom attachment is offered by another supplier for use with fork-type industrial trucks. Mounting lugs facilitate attachment of this unit to the truck.

Double-faced pallets are handled by a hand-operated, hydraulic lift truck where space does not permit the use of a power truck. This unit can be pushed into the pallet and the rear wheels dropped to contact the floor at the other end. Pallet and load is then raised by the hydraulic mechanism. Another hand-operated lift truck has a raised height of 10-in. and is designed for use where the standard 3-in. lift is insufficient. It is suitable for use in narrow aisles.

A rope-guide electric hoist has a drum with deep grooving and has been designed especially for side and end pulling where loads cannot be brought directly under the hoist. A traveling guide finger runs in the groove, ahead of the cable, and holds the cable in its proper location. Single and double-hook types, with capacities ranging from $\frac{1}{4}$ to 5 tons are available.

Don't be floored by NARROW *aisles*

or congested working conditions



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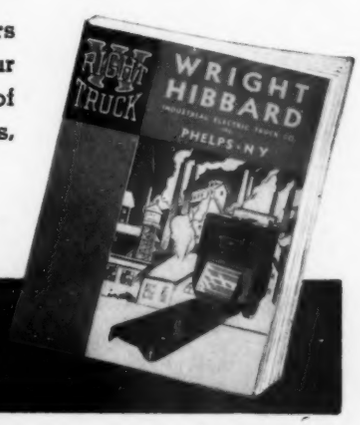


RIGHT TRUCK

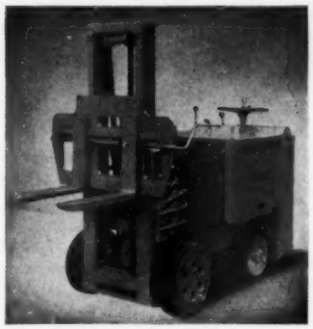
WRIGHT-HIBBARD
Industrial Electric Truck Company, Inc.
PHELPS NEW YORK

Trucks, Power—Trucks, Hand—Hoisting Equipment—Conveyor Parts

Truck, High-Lift, Fork-Type

Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa. (Vol.81,p.28.)

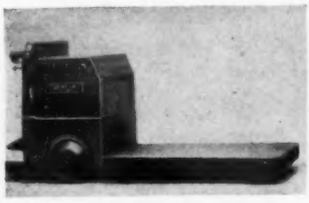
This fork-type industrial high-lift truck is particularly adapted for pig handling in metal refining industries but can be used for the pallet system of materials handling. Forks can be laterally adjusted by a hand crank. This truck has a maximum capacity of 4,000 lb. and is built to turn around in an aisle only 6 in. wider than the total length of the truck and load.



Truck, Platform, Model A-1015-1

Mercury Mfg. Co., 4118 S. Halted St., Chicago, Ill. (Vol.81, p.1056.)

Three speeds in either direction are provided by a snap-action mechanical contactor on the Model A-1015-1 low platform burden carrying truck.

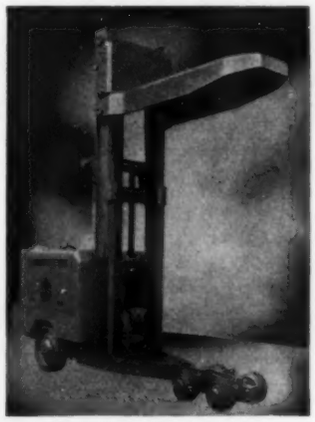


This truck is of the four-wheel steer type, and steering control is of the horizontal lever or tiller-bar type. This truck has a capacity of 4,000 lb. and a 41 in. wide by 72 in. long by 11 in. high load platform. A truck of 6,000 lb. load capacity also is offered.

Truck, Type HH-5, "Hy-Lift"

Baker-Raulang Co., 2168 W. 25th St., Cleveland, Ohio. (Vol.81,p.593.)

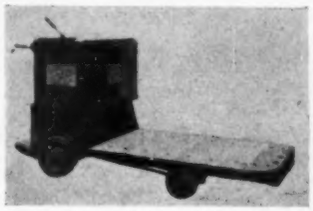
Type HH-5 telescoping "Hy-Lift" tiering truck, of 5-ton capacity, permits tiering skids to 106 in. above floor, while retaining an 88-in. nested height, low enough to enter a standard box car. Platform of the truck is 26½ in. wide by 54 in. long.



Truck, Platform

Wright-Hibbard Industrial Electric Truck Co., Phelps, N. Y. (Vol.81,p.1004.)

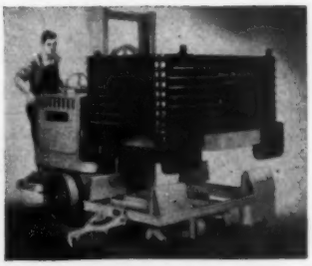
The platform-type, load-carrying truck illustrated features small over-all dimensions and a short turning radius. Size of platform can be varied to suit individual applications, with minimum dimensions of 29-in. width and 34-in. length. Any platform height from 6½ to 22 in. can be furnished.



Boom Attachment, Lift Truck

Mercury Mfg. Co., 4118 S. Halsted St., Chicago, Ill. (Vol. 81,p.718.)

Designed for use with fork-type industrial trucks, this boom attachment is constructed of seamless steel tubing assembled by arc welding. Load attachment to the elevating carriage of the truck is facilitated by the use of lugs.



Trailer, Skid

Mercury Mfg. Co., 4118 S. Halsted St., Chicago, Ill. (Vol. 81,p.24.)

Model A-310-119M skid carrying trailer is designed to link together the lift-truck skid and the tractor-trailer systems of material handling. The corrugated box skid with cut-away supports can be picked up at either end or side by the truck and deposited onto the steel plate bolsters of the trailer, from either side or from the rear end. Clearance of the trailer is 11 in. Capacity is 2 to 3 tons.

Truck, Scoop, Dumping

Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa. (Vol.81,p.142.)

This dumping-shovel scoop truck has been developed for handling bulk materials. It is capable of shoveling into a pile of loose materials, picking up 10 to 15 cu.ft. at one load. The load can be elevated and dumped at any height within the range of the lift mechanism.

Tractor, Gasoline, "Shop Mule"

W. F. Hebard & Co., 433 S. Jefferson St., Chicago, Ill. (Vol.81,p.810.)

The "Midget Shop Mule" gasoline-engine powered industrial tractor, designed to operate in narrow runways and congested areas, measures 76 in. long, 40 in. wide and 50 in. high. Specifications: draw-bar-pull, 2,800 lb.; weight, approximately 3,500 lb.

Tractor, Gasoline, "Super-Huskie"

Mercury Mfg. Co., 4118 S. Halsted St., Chicago, Ill. (Vol.81, p.1174.)

Features of maneuverability, tractive effort, smooth handling and wide speed range are claimed for the "Super-Huskie" industrial gasoline tractor.

This tractor employs a "Chrysler" 6-cylinder heavy-duty, truck-type engine governed at 2,400 r.p.m. Over-all length is 102 in. and maximum width is 65 in. Weight is 4,850 lb., and maximum sustained draw-bar pull in low-gear is 4,000 lb., at 2.25 miles per hour.

Controller, Truck, Rotary-Type

Automatic Transportation Co., 111 W. 87th St., Chicago, Ill. (Vol.81,p.344.)

This industrial truck controller, which is rotary in action and has stator segments of the commutator type, has been developed to provide reliable voltage control, smooth power performance and increased controller life.

Controller, Truck, "NoPlug"

Baker-Raulang Co., 2168 W. 25th St., Cleveland, Ohio. (Vol.81,p.388.)

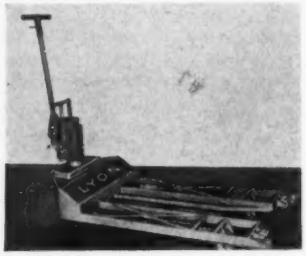
Design of the "NoPlug" truck controller is such that plugging, that is starting from a dead stop in third speed or throwing in the controller from full ahead to full reverse without stopping the motion of

the truck, is prevented. The operator is required to start in first speed and use the acceleration speeds provided.

Truck, Lift-Type, Hydraulic

Lyon Iron Works, Greene, N. Y. (Vol.81,p.1294.)

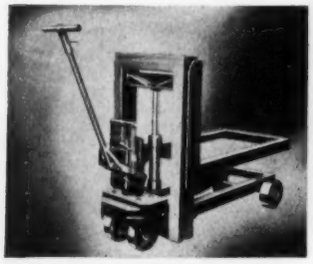
This hydraulic lift truck will handle double-faced pallets at times when a power truck is not immediately available or where space does not permit their use. Truck shown has 4,000 lb. capacity.



Truck, High-Lift Hydraulic

Lyon Iron Works, Greene, N. Y. (Vol.81,p.675.)

This 10-in. hydraulic high-lift truck was designed for use where the standard 3 in. elevation was insufficient. Truck is rated at 3,500 lb. capacity, has a 9 in. lowered height, 19 in. elevated height, and a 24 in. wide by 42 in. long platform.



Truck, Wire Coil, Lift-Jack

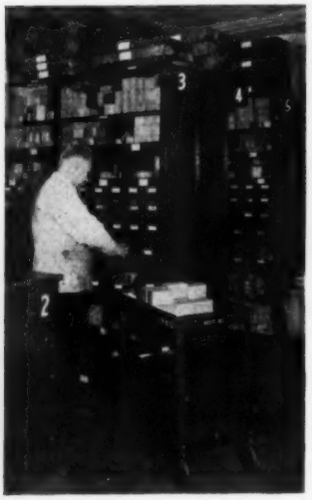
All Steel Welded Truck Corp., Rockford, Ill. (Vol.81,p.265.)

This Clark truck is adapted for use wherever quantities of wire coils are to be transported. The operator can roll coils on the platform from the rear or from either side. Corrugations on the deck hold the coils in position.

Truck, Hand, Type A3

Sabin Machine Co., 6538 Carnegie Ave., Cleveland, Ohio. (Vol.81,p.1060.)

Type A3 truck is offered for handling barrels and drums ranging from keg size to 36 in. high. This unit has an attaching device consisting of a hook and a tongue member.



Cart, Stock

Lyon Metal Products, Inc., Aurora, Ill. (Vol.81,p.28.)

This easy-rolling stock car is designed to speed up stock handling and order filling. Its size permits use in aisles between storage bins. The cart is 32 in. long and 16 in. wide. It is equipped with four large rubber-tired casters. The two shelves are 3 in. deep. A third shelf may be added.

Caster Fork, Swivel, "Doenut"

Musselman Products Co., 6311 St. Clair Ave., Cleveland, Ohio. (Vol.81,p.1226.)

A 10-in. high by 2¾-in. diameter low-pressure tire is used with the "Doenut" tired caster swivel fork. Fork is made of heavy-gage pressed steel and swivel operates on a double ring ball bearing. It may be furnished either with a flat plate or a stud. The flat-plate model shown is 11¾ in. high. Load capacity is 225 lb. per wheel.

Truck, Tote Pan

All Steel Welded Truck Corp., Rockford, Ill. (Vol.81,p.470.)

The Clark tote pan truck is now equipped with two vertical straps, is electric-welded throughout, and has two 6 in. diameter semi-steel wheels with roller bearings. This unit has a 1,000 lb. capacity.

Trucks, Scrap, "Clark"

All Steel Welded Truck Corp., Rockford, Ill. (Vol.81,p.428.)

Two scrap trucks added to the "Clark" line of material handling equipment have bodies measuring 46 in. long at the top, 27½ in. long at the bottom, and 18½ in. deep.

Hoist, Electric, Rope-Guide

Electro Lift, Inc., 30 Church St., New York, N. Y. (Vol.81, p.1294.)

The rope-guide hoist has a drum with deep grooving and has been designed especially for side and end pulling where loads cannot be brought directly under the hoist. Unit is fitted with a traveling guide having a finger which runs in the groove ahead of the cable, holding the cable in its proper location. These hoists are available in sizes ranging from ¼ to 5 tons and all have the speeds and ratings of standard hoists.

Hoists, Electric

Shaw-Box Crane & Hoist Co., Muskegon, Mich. Vol.81,p.424.)

Two small low-head room type electric hoists, built in sizes to lift 350 and 700 lb., are listed under the trade name "Load Lifter Junior." Distance from the bottom of the truck to the hook, when in its highest position, is only 12¾ in.

Hoist, Electric

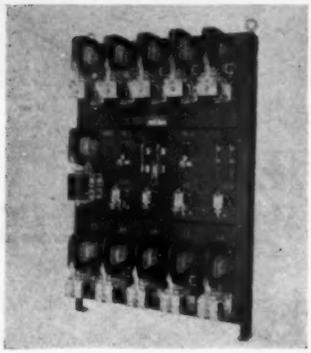
Electro Lift, Inc., 30 Church St., New York, N. Y. (Vol.81, p.25.)

The high-speed, close-headroom, "Junior" type hoist has a hoisting speed of 60 ft. per min. and is built in sizes of 250 lb. and 500 lb. Either rope- or push-button control is available.

Control, Lowering, Crane-Hoist

General Electric Co., Schenectady, N. Y. (Vol.81,p.1240.)

Making use of rocker-bearing contactors and magnetic-time relays that have proven satis-

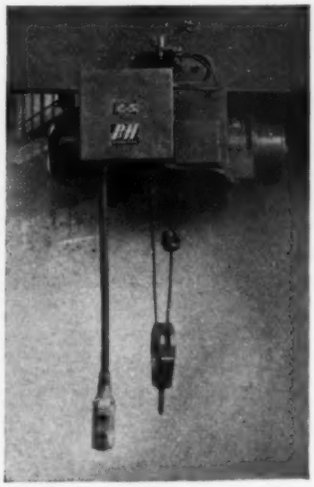


factory in steel-mill service, this d.c. crane-hoist control features high lowering speeds and maximum safety for the operating crew. Other features are good speed regulation, precise spotting of the hook and protection of both motor and brake.

Hoist Control, Pushbutton

Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis. (Vol.81,p.895.)

Push-button control equipment for P & H variable-speed electric hoists eliminates the danger of pendant control ropes

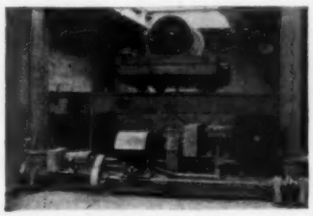


becoming tangled or twisted, thus causing motion in the wrong direction when the incorrect rope is pulled. Push-button element has five control steps and is fully magnetic.

Tables, Drop Pit

Whiting Corp., Harvey, Ill. (Vol.81,p.808.)

Model B drop pit tables are now available with a compound top, permitting the handling of either single pairs of wheels or



complete four- and six-wheel trucks, such as are used on high-speed Diesel-electric trains and pullman cars. The unit shown is of 60 tons capacity and the large top is shown locked at ground level while the small top is lowering a single pair of wheels.

Hoist, Chain, "Power Master"

Coffing Hoist Co., Danville, Ill. (Vol.81,p.675.)

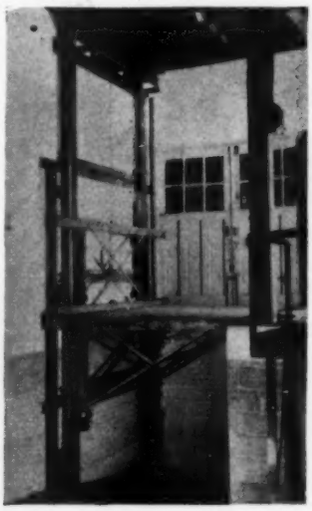
Available in capacities from 1½ to 6 tons, the "Power Master" spur-gear chain hoist features gravity lowering, control

of lowering speed and provision of free chain for quick adjustment to the load. The 1½-ton hoist weighs 98 lb. and the 6-ton unit weighs 141 lb.

Elevator, Freight, "Wallclimber"

Revolvator Co., State St. at Bergen Turnpike, North Bergen, N. J. (Vol.81,p.1295.)

Suitable for lifts up to 12 ft., the "Wallclimber" two-level



freight elevator is available in capacities ranging to 5,000 lb. and with car sizes to 7x10 ft. Only 11 in. along one side is required for rails, cables, anchorage and counterweights. Elevating machinery is located overhead.

Rollers, Conveyor, Heavy-Duty

Mathews Conveyor Co., Ellwood City, Pa. (Vol.81,p.261.)

Two ball-bearing, heavy-duty rollers for roller conveyors have self-contained double seals which protect the ball bearings and raceways from foreign matter. Both types have hexagon axles. Type 63SB roller is available in 4, 4½ and 4½ in. diameters and in standard lengths from 6 to 48 in. Load ratings vary with the diameters from 3,000 to 5,000 lb. Type 105SB roller design includes similar features and is available in 5 in. diameter with lengths to suit requirements. This roller has a continuous rating of 8,000 lb. per roller.

Wheels, Conveyor, Rubber-Tired

Mathews Conveyor Co., Ellwood City, Pa. (Vol.81,p.718.)

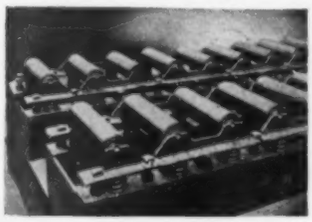
Two sizes of rubber-tired wheels, suitable for conveying fragile objects, are also used

for other purposes where a free-running rubber-tired wheel is necessary. No. 70-RT wheel has a 2⅞ in. outside diameter and a rated capacity of 20 lb. No. 84-RT is 3½ in. in diameter and has a capacity of 50 lb.

Belt Conveyor, Flexible, "Steelbelt"

Acme Steel Co., 2836 Archer Ave., Chicago, Ill. (Vol.81,p. 673.)

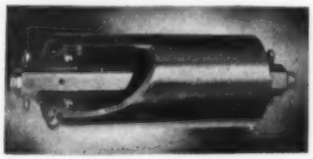
Flat-top "Steelbelt" is made of galvanized or stainless steel formed into links and joined with heavy-gage spindle wires. Ridges on the under side add strength and provide a continuous level surface for idler rolls. It is claimed that the belt will not stretch, is easily cleaned and resists surface abrasion in severe service.



Roller, Conveyor, Resilient

Mathews Conveyor Co., Ellwood City, Pa. (Vol. 81,p.343.)

The resiliently-mounted conveyor is designed for use where heavy loads are to be lifted on to and transported by the conveyor. In this type conveyor, each roller carries its proportionate share of the load.



Roller, Conveyor

Mathews Conveyor Co., Ellwood City, Pa. (Vol.81,p.715.)

Having a rated capacity of 2,200 lb., this 3½-in. outside diameter conveyor roller uses two Type 47-SB ball bearing units. Furnished in length ranging from 6 to 48 in. and can be spaced in the frames on centers ranging upward from 4 in.

Screw Takeup, Conveyor

Jeffrey Mfg. Co., Columbus, Ohio. (Vol.81,p.265.)

This protected-screw takeup for conveyors and elevators has an inverted U-shaped shield which extends from end to end of the takeup frame.

Switch, Conveyor, Radial

Standard Conveyor Co., N. St. Paul, Minn. (Vol.81,p.344.)

Designed to permit immediate discharge of commodities at any one or at numerous points, the full-powered radial switch for use with roller conveyors is controlled by a push-button.

HELPING GOOD MECHANICS DO BETTER WORK

MEET THE NEW
UTILITY POWER DRILLS

THESE sensational new drills are definitely designed to handle thousands of jobs which require more power than is available from the usual service type drill—and which do not require the high spindle speed of the more costly heavy-duty production units. Their low speed is ideal for general drilling with carbon bits, wood augers, hole saws and other accessories. The new Utility Power Drills are built to highest Black & Decker standards of quality—and priced to pay their own way in your plant. Made in 5/8", 3/4" and 7/8" sizes. Your jobber will give you full details or write: The Black & Decker Mfg. Co., 716 Pennsylvania Avenue, Towson, Maryland.

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PORTABLE ELECTRIC TOOLS

Portable Tools

REDUCTION in weight, increased power and reduced maintenance costs are among the important features claimed for most of the portable power-driven tools described on the following pages. Two of the drills shown have chuck spindles placed at a right-angle to the motor in order to provide clearance for working in close quarters. Low-speed, high-torque drills are offered in $\frac{1}{4}$ and $\frac{1}{2}$ in. capacities for drilling stainless steel, Monel and similar hard metals.

Three new hand grinders are offered for die-finishing. One is powered with a 1/19-hp. electric motor and operates at 20,000 r.p.m., the other two develop $\frac{1}{4}$ hp. at 50,000 r.p.m. and $\frac{1}{2}$ hp. at 38,000 r.p.m., respectively, and are powered by air turbines. Several new flexible-shaft tool grinder units have been announced, one being offered in three sizes, each with twelve to fourteen speed changes. These changes can be made without stopping the unit.

Another line of flexible shaft units, available in 1/8 to 1 hp. sizes, uses a ball-bearing countershaft to provide three spindle speeds. One assembly is designed for bench mounting, the other for suspension from a trolley or hook where space is at a premium. Both models have hangers that feature horizontal and vertical pivots and the suspended model has a hook support for the hand-piece when not in use.

Designed with the spindle and motor mounted side by side, an electric-motor powered reamer recently offered is designed for heavy duty drilling and reaming operations in railroad backshops. A portable electric saw announced by the same company permits the use of various types of blades and abrasive disks for rip-sawing and cross-cutting wood, and cutting metal, marble, asbestos, transite, tile and marble. This unit can be adjusted for depth of cut to a maximum of 2 3/8 in. when in a vertical position and $1\frac{3}{4}$ in. when swiveled at 45 deg. An adjustable fence can be fitted to this tool for guiding the saw.

The Stow Line
FLEXIBLE SHAFT TOOLS
Point the way to Production Economies

ASSEMBLY N
ADJUSTABLE HEIGHT 3 SPEED UNIT

For sixty-three years Stow Flexible Shafts have lead the field. Stow Flexible Shaft Units are indispensable factors in maintaining low cost high speed production schedules. Each and every Stow Flexible Shaft Unit reflects the most advanced design and construction to be found in tools of this type—a quality fully demonstrated by their capacity to "take it."

THE NEW STOW LINE

Either single speed or multi-speed units are furnished in four different mountings. Single speed units are 1750 or 3450 RPM. Multi-speed units are 900, 1725 and 3400 or 1800, 3450 and 6800 RPM. Units are available from ¼ to 10 HP.

A complete line of attachments is interchangeable on all machines for

Grinding, Sanding,
Polishing, Buffing, Scratch Brushing,
Drilling, Die Sinking, Routing
and Pattern Finishing.

Stow Flexible Shafts are made in all sizes for all purposes.

Ask for catalog No. 38.

ASSEMBLY F
LOW MOUNTED DIRECT CONNECTED UNIT

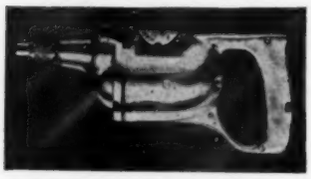
STOW MANUFACTURING CO., INC.
BINGHAMTON, NEW YORK

Drills—Grinders and Buffers—Miscellaneous

Drill, Electric, Light-Duty

James Clark Jr. Electric Co., Louisville, Ky. (Vol. 81,p.22.)

The ¼-in. "Jasco Junior"

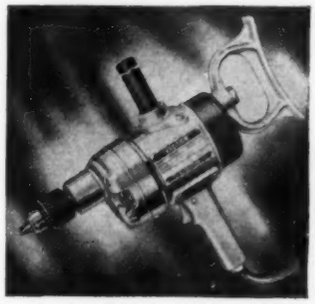


drill is designed for work of an intermittent nature. Weight is 2⅜ and over-all length is 10½ in. The tool is furnished with a 3-jaw key-type chuck.

Drill, Electric, "Victor" No. 124

Stanley Electric Tool Div., Stanley Wks., New Britain, Conn. (Vol.81,p.226.)

No. 124 "Victor" electric drill has ¼ in. capacity. It has a combination spade and



breast-plate handle. No-load chuck speed is 500 r.p.m. Length is 15½ in. and weight is 12½ lb.

Features include specially heat-treated nickel-steel gears and a motor mounted in seal-type ball bearings. The pipe handle may be detached for work in close quarters.

Drills, Electric, Slow-Speed

Skilsaw, Inc., 3310-20 Elston Ave., Chicago, Ill. (Vol.81,p. 343.)

Two slow-speed, high-torque units have been added to the line of ball-bearing electric drills. Of ¼- and ⅜-in. capacity, these drills are available in

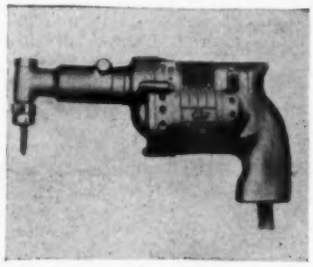
speeds of 350, 450, 600 and 750 r.p.m.

Aluminum alloy bodies give these drills strength, durability and light weight. The ¼-in. drill is 14 in. long and weighs 6 lb.; and the ⅜-in. tool is 14½ in. long and weighs 8 lb.

Drill, Electric, Right-Angle

Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. (Vol.81,p.1060.)

Drill-head on the right-angle type, ⅜-in. capacity portable



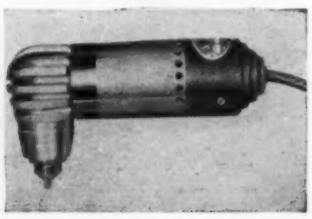
electric drill measures 2½ in. over-all and the angle attachment can be turned and clamped in any position. Possible working clearance is 2⅜ in. and net weight is 3 lb. Over-all length is 9¼ in.

Spindle offset is 1⅜ in. and the drill is equipped with 1/16, 3/32, ⅛, 5/32 and 3/16-in. collets for twist drills. It also can be supplied with a spindle to take a 3/16 in. chuck. Construction features include alloy-steel helical gears and radial-vent cooling. Three models are available: Type U13R which operates at 3,750 r.p.m.; Type U14R which runs at 2,700 r.p.m.; and Type U15R which operates at 5,100 r.p.m.

Drill, Electric, "Shorty"

Black & Decker Mfg. Co., Towson, Md. (Vol.81,p.1114.)

Chuck spindle of the "Shorty" ball-bearing electric drill is mounted at right angles to the motor, reducing the over-all working length of the tool to 4½ in. This drill is available in 3/16 or ¼ in. capacities. Weight, 3¼ lb. Over-all length in the direction of the chuck



spindle is 4½ in. and in the direction of the motor, 7½ in. The 3/16-in. tool has a no-load speed of 3,700 r.p.m., and a full-load speed of 2,300 r.p.m. The 14-in. tool has a no-load speed of 2,500 r.p.m. and a full-load speed of 1,600 r.p.m.

Drill, Electric, "Dyno-Mite"

Millers Falls Co., 101 River St., Greenfield, Mass. (Vol.81,p. 1119.)

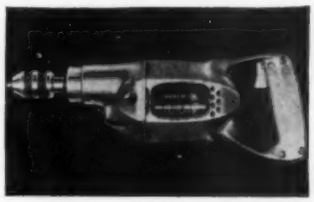
"Dyno - Mite" streamlined electric drill has an over-all length of only 8 in. and width of 2½ in. Motor is housed in a

die-cast aluminum shell. Specifications: capacity in steel, ¼ in.; no-load speed, 1,600 r.p.m.; full-load speed, 875 r.p.m.; weight 2½ lb. The spindle runs in an oversize "Oilite" bearing and is equipped with a ball thrust bearing.

Drill, Electric, Low-Speed

Black & Decker Mfg. Co., Towson, Md. (Vol.81,p.1296.)

This ¼-in. capacity, low-speed drill has been designed for use in drilling stainless steel, monel and other hard metals. It has



a standard spindle-speed of 450 r.p.m. Over-all length, 13 in.; net weight, 6¼ lb. The drill has a triple-reduction gear train to provide torque for drilling the toughest steels.

Grinder, Electric, Tool, No. 10

Dunmore Co., Racine, Wis. (Vol.81,p.266.)

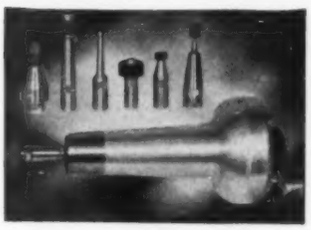
The No. 10 hand grinder has a 1/19-hp. dynamically balanced motor, a ⅛-in. collet chuck, and a three-bearing construction, using precision grease-sealed ball bearings. Speed is 20,000 r.p.m. and weight is 2 lb., 12 oz.

Equipment included with this grinder consists of mounted wheels, abrasive bands and arbor, wrenches and a toggle switch built into the case.

Grinder, Turbine, Tool, No. E-1

Onsrud Machine Works, Inc., 3921 Palmer St., Chicago, Ill. (Vol.81,p.428.)

Developing ½ hp. and 38,000 r.p.m. on 90 to 100 lb. air pressure, the No. E-1 pneumatic turbine grinder has no wearing parts other than the bearings. These are oil lubricated and are kept cool by expanded ex-

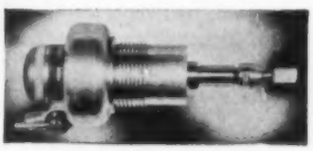


haust air. Specifications: weight, 4¾ lb.; length over-all, 10 in.; largest diameter, 4¼ in. It is claimed that this tool will operate at less than room temperature. Various extension spindles are available.

Grinder, Turbine, Tool, No. MD-1

Onsrud Machine Works, Inc., 3921 Palmer St., Chicago, Ill. (Vol.81,p.467.)

Case of the No. MD-1 air turbine grinder has been



changed to fit conveniently into the palm of the operator's hand. This tool develops ¼ hp., and 50,000 r.p.m. on 90 to 100 lb. air pressure. Centrifugal action feeds oil through resistance elements to the precision ball bearings.

This construction insures adequate lubrication when the tool is running and none when it is idle. Bearings are cooled by exhaust air, and it is claimed that the tool will operate continuously at less than the temperature of the room in which it is used.

Grinder, Portable, High-Cycle

Black & Decker Mfg. Co., Towson, Md. (Vol.81,p.806.)

This high-cycle portable grinder is designed for general service in railway and car shops and in sheet-metal shops for

work requiring an 8-in. wheel. When desired, a sheet-metal wheel guard can be furnished for wire-brushing applications.

These tools have a high power to weight ratio, and they will maintain high grinding speed under heavy load. It is claimed that the distribution of weight is such that this grinder can be used conveniently in any position.

Grinder, Portable, No. 970-G

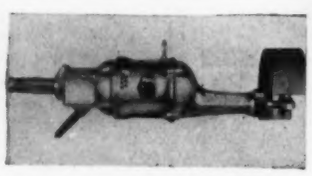
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. (Vol.81,p.184.)

The No. 970-G grinder is a production unit for general-

purpose grinding. It also can be used for wire brushing, buffing and polishing all types of metal surfaces. Specifications; wheel size, 6x1 in.; speed, loaded, 2,600 r.p.m.; net weight, 22 lb.; over-all length, 24½ in. The totally inclosed fan-cooled motor has sufficient power to maintain speed under load. The wheel guard is adjustable.

Grinder, Electric,

Black & Decker Mfg. Co., Towson, Md. (Vol.81,p.1006.)



Designed for use with specially-bonded wheels for high-speed, heavy-duty service, this 8-in. portable grinder has bearings set at the extreme ends of the spindle to absorb side thrust. Tool is suitable for grinding, buffing and polishing. A sheet-metal wheel guard is furnished.

Grinder, Tool, Flexible-Shaft

Chas. L. Jarvis Co., Middletown, Conn. (Vol.81,p.804.)

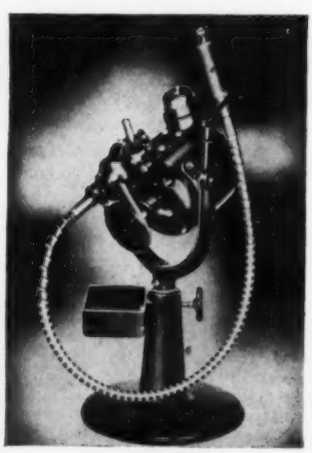
The "Vario-Flex" flexible-shaft grinder, offered in three sizes, features from twelve to fourteen instant speed changes without stopping the machine.

Motor unit is mounted on a swivel which permits operations at any angle on the horizontal plant. Shaft speeds range from 2,200 to 4,700 r.p.m. for the 1-hp. Type VF-1 model and from 2,000 to 4,500 r.p.m. for the 1½- and 2-hp. Type VF-15 and Type VF-20 models. The heavy-duty handpiece is equipped with two double-row ball bearings. The two smaller models have a ¾-in. spindle while the Type VF-2 unit has a 1-in. spindle.

Grinder, Tool Flexible Shaft

N. A. Strand & Co., 5001 N. Wolcott Ave., Chicago, Ill. (Vol.81,p.628.)

Type MY-4 flexible-shaft grinder is driven by a ¼-hp. motor with an integrally mounted 3-speed ball-bearing countershaft. The motor is



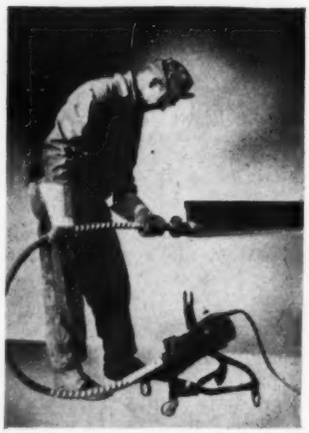
mounted in a swiveling yoke. A 4-ft. flexible shaft with a ball-bearing handpiece fitted with a split collet is furnished. Machine can be furnished with low range speed of 1,700, 3,000 and 5,200 r.p.m. or high speed range of 3,400, 6,000 and 10,400 r.p.m.

A small ball-bearing, right-angle attachment has been developed for use with this grinder. This attachment is arranged with a split collet for holding tools having round shanks.

Grinder, Universal, Flexible-Shaft,

Mall Tool Co., 7740 S. Chicago Ave., Chicago, Ill. (Vol.81,p. 469.)

This 1½-hp. universal flexible-shaft grinder operates at 9,000 r.p.m. at either 110 or 220 volts a.c. and d.c. With this



high speed a 4-in. wheel will accomplish the same results as an 8-in. wheel used on a slow-speed unit.

This grinder is intended for grinding weld seams, flat surfaces, surfacing and snagging castings, grinding stainless steel and other parts in metal-working plants.

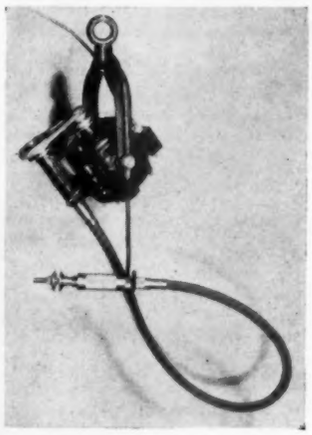
Grinders, Tool, Flexible-Shaft

Stow Mfg. Co., Binghamton, N. Y. (Vol.81,p.1114.)

Two lines of flexible-shaft toolroom units are equipped with a ball-bearing countershaft which gives three spindle speeds by shifting the V-belt. Each type is available in ⅛, ¼, ½ and 1-hp. capacities. The ⅛ and ¼ hp. units each have two speed ranges, giving shaft

speeds of 6,800, 3,425 and 1,800 r.p.m. or 3,400, 1,725, and 900 r.p.m. The 1.2-hp. units shaft speeds of 3,400, 1,725 and 900 r.p.m., while the 1-hp. units have shaft speeds of 6,800, 3,425 and 1,800 r.p.m. Shaft core sizes range from ¼ to ⅝ in. diameter and shaft lengths range from 4 to 6 ft.

The ball-bearing handpiece furnished as standard equipment has a clamp spindle to take grinding wheels, buffs and scratch brushes. Angle heads and special handpieces can be interchanged with the standard handpiece.



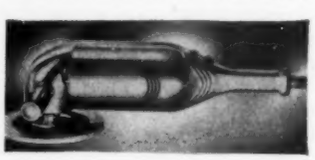
Assembly P, above, is designed for bench mounting. This unit may be mounted on a bench, truck or on a wall in back of the bench. Assembly V, below, is designed for use in shops where floor space is at a premium. It may be mounted on a trolley or suspended from a hook.

Both models are equipped with hangers that have both horizontal and vertical pivots and the suspended model has a hook support for the handpiece when not in use.

Sanders, Disk

Skilsaw, Inc., 230 N. Michigan Ave., Chicago, Ill. (Vol.81,p. 469.)

Two 7-in. disk sanders, one for heavy duty and one for constant production service have aluminum-alloy bodies, die-cast in a smooth design. An air filter protects the commutator and motor from abra-

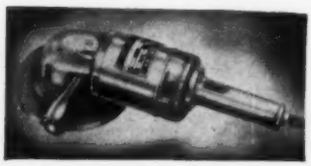


sive dust and dirt. The heavy-duty Model G unit is 16¾ in. long and weighs 12½ lb. while the continuous-production Model L is 16¾ in. long and weighs 14 lb. These sanders are suitable for removing weld marks, rust and dirt from metal surfaces and for sanding metals, and smoothing steel and castings.

Sander, Disk

Stanley Works, New Britain, Conn. (Vol.81,p.23.)

Electric disk sander No. 77 is designed for production and repair work. The unit is fur-

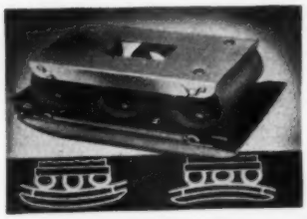


nished with a 7 in. flexible pad, twelve sanding disks, wrenches and a heavy rubber-covered 3 conductor cable. It is ball bearing equipped throughout, light in weight and easy to handle.

Sander, Pneumatic, "Speed-Bloc"

Sterling Products Co., 2457 Woodward Ave., Detroit, Mich. (Vol.81,p.220.)

Balance of the pneumatic "Speed-Bloc" sander has been improved and weight has been reduced from 7½ to 5½ lb. Overall dimensions are 7 in. long, 4¾ in. high and 3¾ in. wide.



The unit operates on 45 to 60 lb. air pressure. Sanding action is reciprocal, with ⅝ in. travel of the pad at 1,750 to 3,000 oscillations per min. Special pads varying in flexibility have been developed for particular types of surfaces and materials.

Reamer, Electric, Heavy-Duty

Black & Decker Mfg. Co., Towson, Md. (Vol.81,p.1061.)

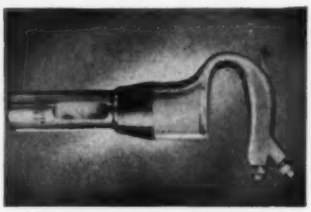
Designed with the spindle alongside the motor and with the feed screw and tool-bit knock-out arrangement built

into the spindle, this high-cycle reamer is claimed to be suitable for constant service on heavy-duty drilling and reaming operations in fabricating plants and railway equipment and repair shops.

Hammer, Pneumatic, Chipping

Master Tool Co., 5605 Herman Ave., N. W., Cleveland, Ohio. (Vol.81,p.258.)

The "Master" chipping hammer features a "life-time" valve block that, it is claimed, will last the life of the tool. A locking device prevents the



handle from working loose and an extra bushing in the handle receives the air inlet bushing and protects the threads in the handle proper. Another feature of this hammer is the chromium-plated cylinder.

Scaling Tool, "Cleco" No. B1

Cleveland Pneumatic Tool Co., 3738 E. 78th St., Cleveland, Ohio. (Vol.81,p.427.)

The "Cleco" No. B1 sealing tool is claimed to be suitable for the removal of weld splatter and excess metal in production welding. It has also been found

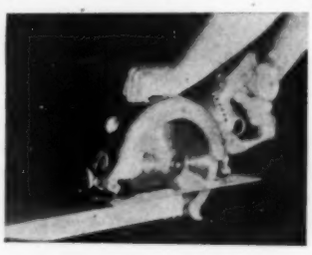
useful for removing sand from castings and for removing rust and old paint from tanks. Tool weighs 3½ lb. and is 11 in. long.

A graduated control valve, which is located at the rear end of the tool, automatically admits the correct amount of compressed air to the operating cylinder. Exhaust air from the tool is directed in such a manner as to blow off chips and scale.

Saw, Electric, Portable, 7-in.

Black & Decker Mfg. Co., Towson, Md. (Vol.81,p.1292.)

This 7-in. portable electric saw has a 2⅜-in. maximum depth of cut. Depth can be ad-



justed and set at any point up to maximum. Saw table may be tilted for angle or bevel cutting and locked at any angle from 0 to 45 deg. Various types of blades and abrasive disks are available, permitting use of this tool for rip-sawing cross cutting, metal cutting, slotting marble, asbestos, transite, tile and porcelain.

Nut Runners

Black & Decker Mfg. Co., Towson, Md. (Vol.81,p.869.)

Both the Nos. 32 and 42 nut runners have been designed for hard driving on production operations. They are suitable for driving wood screws, lag screws and running up nuts

and bolts on all types of assemblies. No. 32 unit has capacity for nuts and bolts up to ½-in. diameter and the No. 42 nut runner is designed for marine and railway construction work.

Pliers, Electric, "Thermo-Grip" No. 10

Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill. (Vol.81,p.339.)

Having capacity to handle pipe or fittings up to 4 in. diameter, the No. 10 "Thermo-Grip" electric pliers are simi-

lar to the No. 5 pliers previously announced. These pliers can be used to sweat joints without unsweating adjacent connections.

Pliers, Electric, No. 2 Midget

Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill. (Vol.81,p.1290.)

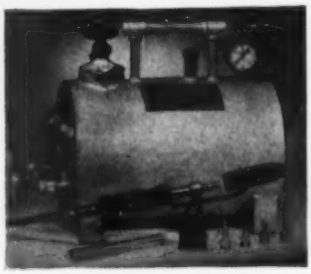
Designed to handle small soldering applications in re-

stricted spaces, the No. 2 "Midget" Thermo-Grip electric pliers may be used for sweating joints on small copper pipe and tubing up to ⅜ in. in diameter. These pliers are hinged at the end, allowing for flexibility, sensitive pressure and ease of handling. Carbon jaws provide a firm gripping surface.

Soldering and Brazing Unit

Reiner & Campbell, Inc., 242 Lafayette St., New York, N. Y. (Vol.81,p.142.)

The "Ace" soldering and brazing unit is a portable acetylene-gas generator equipped with tools for soldering, brazing, melting and heating purposes. Generator produces gas



without pumping or preheating and can be recharged with carbide while in operation. One filling will last for four to five hours. All torches are equipped with needle-valve regulation.

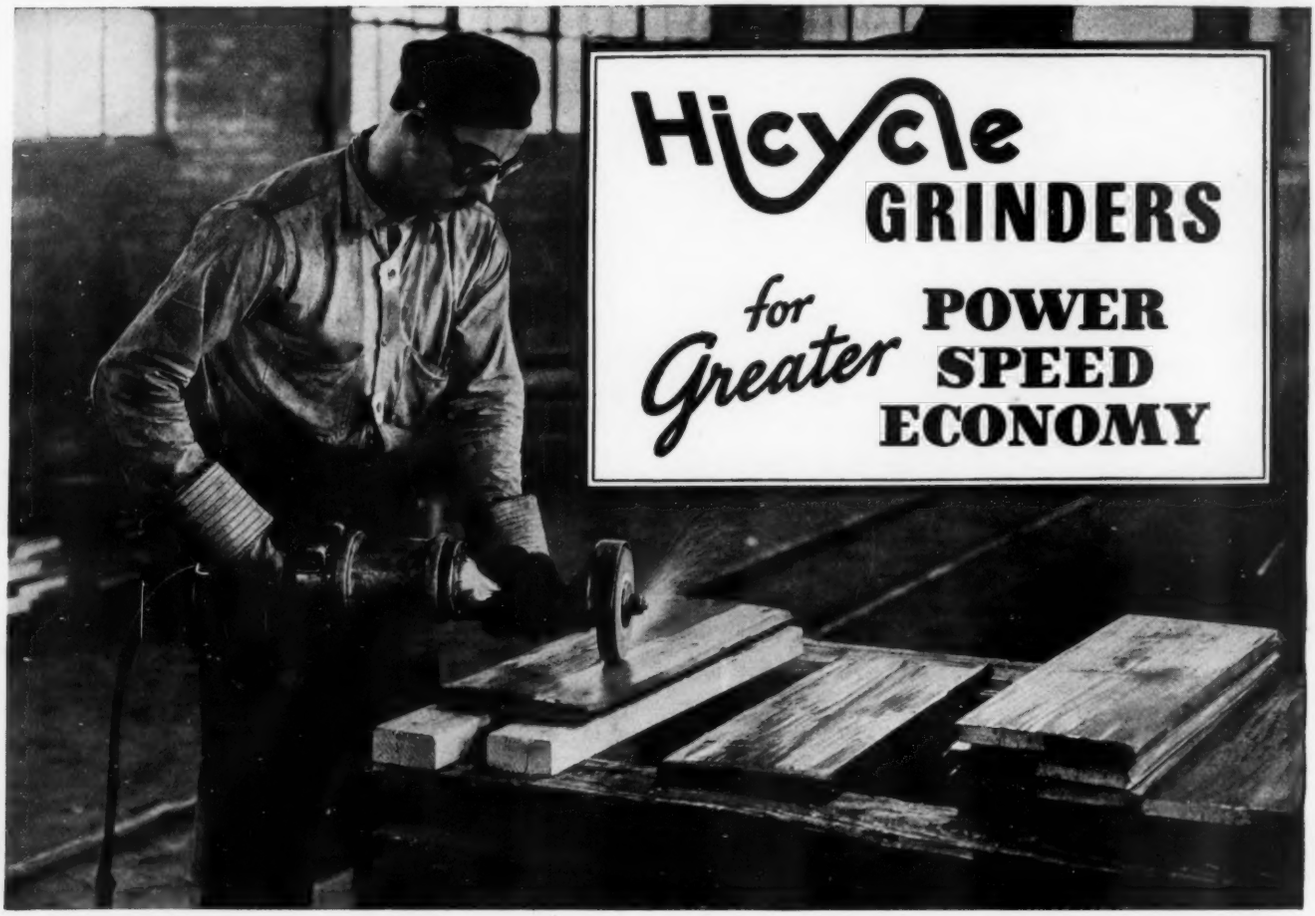
Demagnetizer, A.C., Portable

O. S. Walker Co., Worcester, Mass. (Vol.81,p.186.)

These portable a.c. demagnetizers are particularly adapted for the removal of residual magnetism from machine knives, shear blades and large dies. Laminated core of the unit is mounted in a frame

with handles and is recessed for the energizing coil. It is inclosed in a 4½ in. diameter by 5¾ in. long cylinder which rotates about the core as the unit is moved along the work. It is suitable for work 1 in. or more in thickness.

Standard units weigh approximately 10 lb. and are available for 60 cycle, single-phase, a.c. 110- or 220-volt circuits. Unit is fitted with snap switch for energizing the coil.



IN THE NEW MILL OF RUSTLESS IRON AND STEEL CORPORATION

One of the many Hicycle Grinders in this modern Baltimore mill is shown in operation. They were chosen for their superior POWER, SPEED and ECONOMY—advantages that must be considered if you want to do the best possible work in the shortest possible time.

May we send you the Hicycle Blue Book No. 900 which shows the entire line of Hicycle tools — Drills, Reamers, Screw Drivers, Nut Runners, Stud Setters, Tappers, Buffers, Grinders, Sanders and Polishers.

CHICAGO PNEUMATIC TOOL COMPANY

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OIL WELL ROCK BITS, REAMERS & TOOL JOINTS

EL-1-38

CHICAGO PNEUMATIC

Plant Equipment

COMBINATION mercury-mazda lighting units have been developed to produce a light that is claimed to be both visually comfortable and to blend well with daylight. Reflectors are fitted with diffusing bowls to minimize glare. Specially designed reflectors are available for lighting stock bins, tool cribs and similar locations; others are designed for those applications where it is desired to apply a generous amount of light to localized work-places. Spotlights are available for producing as much as 1,000-footcandles of lighting over restricted areas of vertical or horizontal surfaces.

Unit heaters and humidifiers are available for heating large or small areas in the plant. Most of these units are equipped with automatic controls and one gas-fired unit has a pilot-light that is ignited at the start of the heating season and left burning throughout the cold months. An electrostatic precipitator is offered for industrial air-cleaning applications. This unit permits dust and fume collection at low cost. Two systems of air-line freeze prevention have been offered. One is claimed to eliminate air-line and air-tool freezing down to 70 F. below zero.

Drafting machines and drawing tables are offered to facilitate work in the design office. One of these units can be controlled entirely with the left hand. Parallel motion of this unit is maintained by tempered steel bands held under constant tension. Improvements in blueprinting equipment continue to be offered. One automatic unit will expose, develop and dry prints in a continuous operation. Another unit is designed for use with a black-and-white developing machine. Paper exposed in this unit can be developed and used immediately; prints do not require washing or drying.

THROW MORE LIGHT ON PRODUCTION ECONOMY

WITH THE

"24-HOUR SKYLIGHTS"

You can save the time lost by workers in the mere physical act of "seeing" under usual plant illumination. By so doing you automatically make production more efficient and of more uniform high quality. Cooper Hewitt light can do this job for you most effectively. It is a detail-revealing, restful light that makes all seeing tasks easy. Errors that lead to rejects are eliminated and workers do not feel the common, costly end-of-shift fatigue from eye-strain.

Cooper Hewitt light gives "better than daylight" to more than a million workers in every branch of industry. Its use is rapidly increasing. The new Cooper Hewitt Lamps give 22% more light with no increase in current. It will pay you to throw more light on production . . . with lighting engineered to fit the job. General Electric Vapor Lamp Company, 831 Adams St., Hoboken, N. J.

In this large machine department every inch of floor space is made equally useful through the uniform high levels of illumination provided by Cooper Hewitt light. A workman is never in his own shadow. He can see details anywhere, and works without eye-fatigue throughout the entire shift.

GENERAL ELECTRIC
VAPOR LAMP COMPANY

851C

Lighting Units—Unit Heaters and Humidifiers—Air Compressors and Cleaners—Drafting and Blueprinting—Safety Equipment and Supplies—Miscellaneous

Lighting Units, Combination

Benjamin Electric Mfg. Co., Des Plaines, Ill. (Vol.81,p. 1296.)

This dome-type combination unit uses an arrangement of three 150-200 watt incandescent lamps around a central 400-watt mercury lamp to produce a light that is claimed to be

both visually comfortable and to blend well with daylight. An opal glass cylinder lowers the normal 78 deg. cut-off of the reflector to 61 deg., which is said to minimize the possibility of direct glare. In the event of momentary current failure, the incandescent lamps supply stand-by illumination during the interval necessary for the mercury to cool and automatically restart.

Lighting Units, Combination

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol. 81,p.387.)

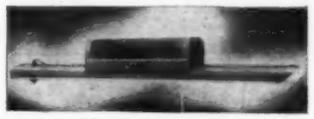
A combination unit, that mixes the light lumens of the 400-watt high intensity mercury lamp with a quantity of

light lumens from incandescent lamps, is designed for application in industrial lighting where color correction is desired. These units should be mounted at heights ranging from 12 to 18 ft.

Lighting Units, Long-Tube, Mercury

General Electric Vapor Lamp Co., Hoboken, N. J. (Vol.81, p.674.)

A vacuum-type interrupting switch, now used in place of the "shifter" formerly used, is claimed to give instant starting and added dependability



for these mercury lighting units of the long-tube, Cooper-Hewitt type. These units, equipped with enameled reflectors, are claimed to have an over-all efficiency of about 15 lumens per watt. Both the reflector and tube are designed for mounting in a horizontal position. A "skylight" unit, combining the new long-tube light source with incandescent lamps, is offered for use where a close approach to daylight color values is required.

Reflectors, Aluminum, 400-Watt

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol. 81,p.258.)

These aluminum reflectors, designed properly to distribute light from 400-watt high-intensity mercury lamps, are par-

ticularly suited for general lighting where the mounting height is 18 ft. and over. A Mogul type socket is mounted in the hood.

Reflector, Vapor-Proof

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol. 81,p.306.)

Angle-type, vapor-proof reflectors for use with 250-watt high-intensity mercury-vapor lamps are designed for severe service conditions, such as loca-

tions where excessive moisture and non-combustible dust are present. The unit consists of a cast-iron hood with medium socket, an opal-glass globe and a porcelain enamel reflector. In locations with overhead obstructions, these units, mounted on the sidewalls, provide illumination on horizontal or vertical surfaces. The hood is tapped for ½-in. conduit.

Reflector, Lighting, "Glassteel"

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol. 81,p.343.)

Designed properly to distribute the light from the 250-watt high-intensity mercury lamp where the mounting height is under 18 ft., the "Glassteel" diffuser is suitable for lighting

machine shops, plating and polishing rooms, assembly lines and similar departments. The diffuser consists of a white porcelain-enameled reflector, which directs the light downward, and a diffusing globe.

Reflector, Lighting, "Millite"

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol. 81,p.1008.)

"Millite" lighting units are designed to provide maximum light output under severe serv-

ice and atmospheric conditions. They are claimed to be especially suitable for use in heavy industry applications where moisture, smoke, dust, dirt, acid fumes or hard use preclude the use of ordinary open-type high-day units. The "Millite" unit is dust-tight and vapor-proof and the reflector is treated by the "Alzak" process. Complete unit consists of a steel housing, a removable reflector and a hinged glass cover. It is designed for use with 750, 1,000 or 1,500 watt lamps.

Reflector, Angle, High-Intensity

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol. 81,p.427.)

This balanced, symmetrical-angle reflector is designed for use with 400-watt high-intensity mercury lamps. It is recommended for applications requiring local lighting of vertical or horizontal surfaces.

Reflector, Lighting, "Silvered Lamp"

Benjamin Electric Mfg. Co., Des Plaines, Ill. (Vol.81,p.343.)

The "Silvered Lamp" luminous-top, diffusing reflector has

been developed for use with "Silver-Bowl" type lamps, where it is desired to provide soft, even illumination with minimized direct and reflected glare. These units are available in two sizes for 200 and 300-500 watt lamps.

Reflector, Lighting, "Stock-Bin-Lite"

Benjamin Electric Mfg. Co., Des Plaines, Ill. (Vol.81,p.345.)

A specially designed reflector effectively solves the problem of uniform lighting for bins,

shelves and stacks in stock rooms, tool cribs and similar locations. The "Stock-Bin-Lite" reflector provides uniform illumination from top to bottom of the tiers. Sizes are available for 60, 75-100. and 150 watt lamps. The deep, trough-shaped reflector directs maximum light downward to the bins near the floor.

Lighting Unit, Lamp, Daylight

Barkon-Frink Tube Lighting Corp., 23-10 Bridge Plaza S., Long Island City, N. Y. (Vol. 81,p386.)

This lamp, in which carbon dioxide is used in the lighting tube, is claimed to give the same results as are obtained

under a slightly clouded northern sky. From 10 to 40 ft. candles illumination are directed on a working plane 30 in. below the lamp grid.

Lighting Units, Short-Coupled

Fostoria Pressed Steel Corp., Fostoria, Ohio. (Vol.81,p.262.)

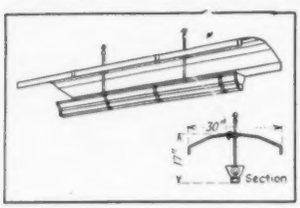
Designed for use where space for attachment is limited, these short-coupled localized lighting

units are available in two sizes. Difference between the two is in size of reflector only. The No. 12 unit, shown, is 12½ in. long over-all and will accommodate up to a 60-watt bulb. No. 12C unit is 11½ in. long and is equipped with a shade assembly which accommodates 15 and 25 watt bulbs.

Lighting Unit, "Light-Hood"

Curtis Lighting, Inc., 1123 W. Jackson Blvd., Chicago, Ill. (Vol.81,p.306.)

The "Light-Hood" indirect lighting unit consists of a Lunax aluminum trough containing the light sources and a steel diffusing hood which breaks up the light and re-



directs it to the working level. In standard sections, 100-, 150- or 200-watt lamps are used on 30-in. centers in the trough.

Lighting Unit, Localite, Uni-Focal

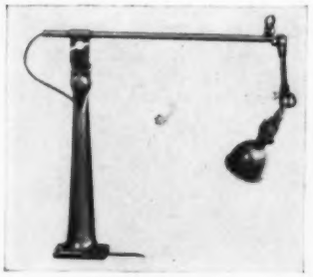
Fostoria Pressed Steel Corp., Fostoria, Ohio. (Vol.81,p.183.)

The Model U-58 uni-focal lighting unit is specially designed for installation on benches and tables that are subject to excessive vibration. Unit is completely flexible, horizontally and vertically without the use of tools, yet it is rigid in any position. Over-all length is 33 in. and the base is 14 in. high. Horizontal arm is 15 in. long.

Lighting Units, Localite

Fostoria Pressed Steel Corp., Fostoria, Ohio. (Vol.81,p.1005.)

Flexible "Localite" industrial lighting units No. 71 and No.



72 accommodate standard double-contact candelabra bayonet-base type lamps in either the 6-8 volt or the 110-115 volt classifications.

Lighting Unit, "Beam, Director"

Benjamin Electric Mfg. Co., Des Plaines, Ill. (Vol.81,p. 304.)

The "Beam-Director" lighting fixture attachment makes it possible to convert existing reflectors into supplementary lighting units. These units consist of simple, auxiliary projectors of etched Alzak aluminum which are quickly and easily attached inside the skirt of dome reflectors.

Lighting Unit, Spot-Light

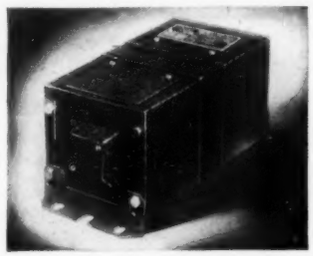
Benjamin Electric Mfg. Co., Des Plaines, Ill. (Vol.81,p. 1296.)

Designed to supplement general illumination, this lighting intensifier is capable of building up approximately 1,000-footcandles of lighting over restricted areas of vertical or horizontal surfaces. Units are available in adjustable focus types from 60-200 watts, using medium base lamps and in fixed focus, 300-500 watt mogul-base types.

Transformer, Lighting

Acme Electric & Mfg. Co., 1444 Hamilton Ave., Cleveland, Ohio. (Vol.81,p.632.)

Designed especially for use with high-intensity mercury-vapor lamps, these lighting



transformers are available in an inclosed universal mounting type or in an open core and coil type for 50- or 60-cycle circuits are available for different primary voltages and lamp sizes.

Socket Seal, Lamp

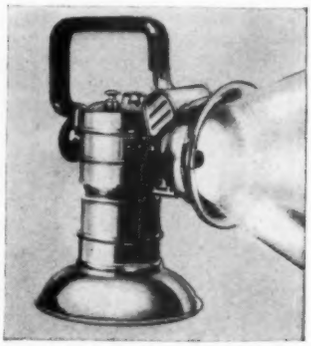
Fostoria Pressed Steel Corp., Fostoria, Ohio. (Vol.81,p.1286.)

This rubber socket seal, designed for use in conjunction with lamp bulbs and sockets, consists of a molded rubber collar which fits over the open end of the socket. When the lamp bulb is inserted the socket-lamp union is fully protected.

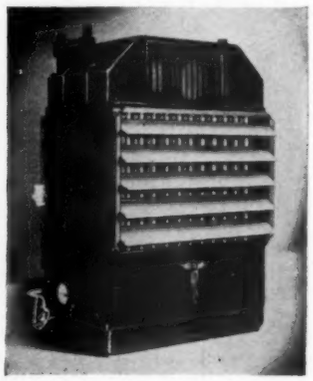
Lantern, Carbide, Type NJ-1

National Carbide Corp., 60 E, 42nd St., New York, N. Y. (Vol.81,p.894.)

This carbide lantern, designed for use by railroads and associated industries, is



equipped with a safety flame protector, heat-resisting glass lens and porcelain burner-tips. Of light weight to meet the requirements of car inspectors, the lantern can be used for 8 hr. on one charge of carbide.



Heaters, Unit, "Janitrol"

Surface Combustion Corp., Toledo, Ohio. (Vol.81,p.26.)

No labor is involved in using "Janitrol" unit heaters, it being necessary only to light the pilot burner at the beginning of the heating season and to set the thermostat at the desired temperature.

Heaters, Unit

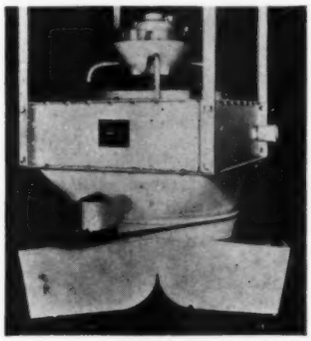
Trane Co., LaCrosse, Wis. (Vol.81,p.145.)

Model "VS" vertical unit heaters are available for applications where it is desired to cover a broad expanse of floor space with a direct stream of heated air.

Heater, Unit

L. J. Wing Mfg. Co., 154 W. 14th St., New York, N. Y. (Vol.81,p.387.)

This revolving-discharge unit heater causes the moving air streams to sweep slowly around

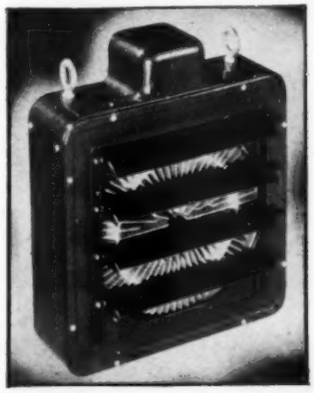


through 360 deg., covering successively every direction.

Heater, Unit, "Electromode"

Electric Air Heater Co., Div. of American Foundry Equipment Co., 555 S. Byrkit St., Misawaka, Ind. (Vol.81,p.592.)

Model IBN "Electromode" industrial heater has a cast aluminum grid which has been poured around a calrod heating

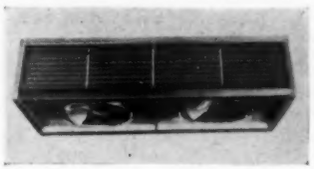


element. A motor driven, four-bladed aluminum fan, running in a graphite-impregnated bronze bushing dissipates heat from the grid and circulates the warm air. Adjustable deflectors are provided.

Heater, Projection, Multiple Unit

Trane Co., LaCrosse, Wis. (Vol.81,p.1118.)

The lightness and flexibility of the propeller-type unit heater is combined with the

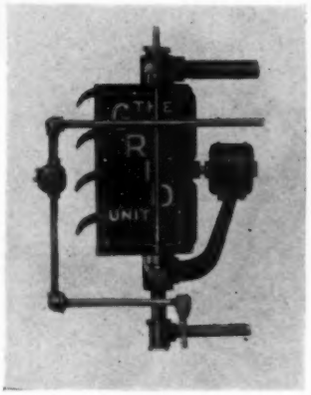


long-range delivery and large capacity of the heavier blower-type heater in this multiple-projection heater. It is a high-velocity multiple-fan unit, with each fan under individual control, and is arranged for ceiling-mounting.

Humidifier, "Grid"

Unit Heater & Cooler Co., Wausau, Wis. (Vol.81,p.813.)

This humidifier, designed to be attached either in front of or directly behind a unit heater, requires no air lines or extra piping for installation. Unit may be operated with the unit heater or as an individual unit. Humidifying action continues to function until such time as desired conditions are attained.



Cleaner, Air, Electrostatic

Pangborn Corp., Hagerstown, Md. (Vol.81,p.220.)

This electrostatic precipitator for industrial air cleaning permits dust and fume collection by electrical means within the range of general applications at economical installation and operating cost. Units may be designed to remove particles as small as one-fifth micron.

Fan, Four-Blade

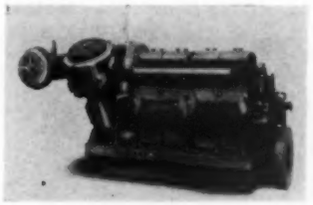
Trane Co., LaCrosse, Wis. (Vol.81,p.1176.)

Designed for quiet operation and high efficiency, this four-blade propeller fan is incorporated in Trane unit-heaters and unit-coolers. These fans are built with four curved steel blades of large area, set at an angle of 30 deg. with the plane of rotation.

Air Compressors, Class W-CO

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. (Vol.81,p.1004.)

Arranged for mounting on a permanent foundation or on skids, Class W-CO stationary compressors are driven by Type 48 diesel engines. They are built in sizes having three or four engine cylinders, rated at 112½ and 150 hp. respectively, with two-stage compressor cylinders, having piston dis-

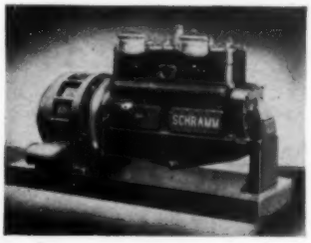


placements of 655 and 830 cu.ft. per min. respectively, for a normal discharge pressure of 100 lb. per sq.in. at sea level. Engine of this unit is started by compressed air.

Air Compressor, "Utility"

Schramm, Inc., West Chester, Pa. (Vol.81,p.468.)

Features of "Utility" compressors include a mechanical intake valve located in the compressor block and operated from the camshaft in timing with the piston travel. Four-cylinder models have five main bearings and six-cylinder models have seven main bearings. Capacities range from 85 to 420 cu.ft. delivery per minute.



Freeze Preventive, Air Line, "Tanner"

Sullivan Machinery Co., Michigan City, Ind. (Vol.81,p.23.)

Tanner air-line anti-freeze system tanks are built to A.S.M.E. specifications of

welded construction for 200 lb. working pressure. It is claimed that this system eliminates air-line and air-tool freezing down to 70 F. below zero. It is harmless, odorless, and non-explosive and will not injure metal, hose or lubrication.

Freeze Preventive, Air Line, "Frosto"

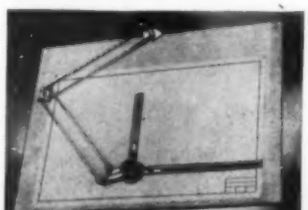
Sullivan Machinery Co., Michigan City, Ind. (Vol.81,p.1240.)

Designed to supplement the "Tanner Gas" system of preventing freezing in air lines and pneumatic tools, "Frosto" is offered for industrial applications where electric current is available for its operation. "Frosto" is vaporized and fed into the compressed air line near the compressor. Thermostatic control is used.

Drafting Machine, Model R-300

Wrigraph Sales Div., 5205 Euclid Ave., Cleveland Ohio. (Vol.81,p.265.)

Model R-300 "Wrigraph" drafting machine is self leveling and will make drawings



up to 28x38 in. The parallel mechanism is permanently calibrated and it is assembled with eight ball bearings, which are prelubricated.

Drafting Machine, "Paragon"

Keuffel & Esser Co., Adams & Third Sts., Hoboken, N. J. (Vol.81,p.262.)

The "Paragon" drafting machine can be controlled entirely by the left hand. It consists of a jointed arm of aluminum alloy, having a protractor head

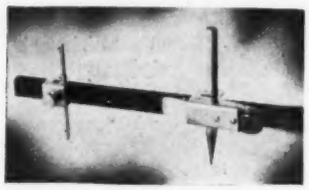
fitted with two scales at 90 deg. Parallel motion is maintained by tempered steel bands, under constant tension, which are concealed within the arm sections. Two models are available.

Stands, Drawing, Table-Type

Westbrook Equipment Co., 10016 Greenview Ave., Garfield Heights, Cleveland, Ohio. (Vol. 81,p.591.)

This stand is attached to the table by use of a formed metal base and two rods. Height and

angle of the stand can be adjusted to suit individual requirements.



Compass, Beam, "Perfect"

A. P. Bartusch, 775 Walnut St., Lockport, N. Y. (Vol.81, p.467.)

Any standard pencil or ruling pen can be used with the "Perfect" beam compass. Metal parts are of nickel silver. Radii as small as 1⅜ in. can be ruled. Standard 12-, 24- and 36-in. beams are available.

Eraser, "Rush"

Eraser Co., Inc., 120-1¼ E. Washington St., Syracuse, N. Y. (Vol.81,p.1061.)

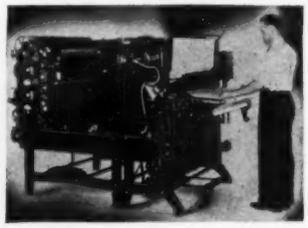
Soft rubber tips for pencil or carbon copy erasures are provided in one end of the "Rush Eraser" holder and the other end is fitted to take "Fiberglass" refills. These are claimed to remove India ink from tracing cloth and can also be used

as a superfine abrasive to polish metal.

Blue-Printer, Revolute No. 3H

Paragon-Revolute Corp., 77 South Ave., Rochester, N. Y. (Vol.81,p.587.)

No. 3H automatic blueprinting machine is designed for rapidly exposing developing and drying blueprints in one

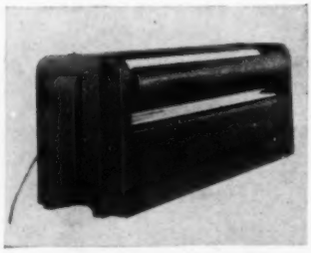


continuous operation. This machine is made in 42 and 54 in. widths for operation with 220 volts, a.c. or d.c. Dryer can be equipped for gas or electrical heating.

Printer, Continuous, Model 3-BW

Chas. Bruning Co., Inc., 102 Reade St., New York, N. Y. (Vol.81,p.468.)

Used in conjunction with the Bruning black-and-white developing machine, the Model



3-BW printer provides an inexpensive means of producing black-line prints from tracings or drawings. It is claimed that paper exposed in the Model 3 printer can be developed and used immediately.

Blue-Printer, Model "M 42"

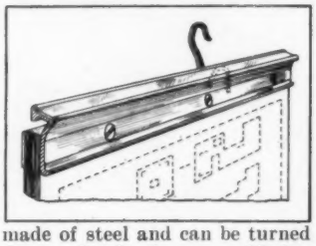
Shaw Blue Print Machine, Inc., 9-11 Campbell St., Newark, N. J. (Vol.81,p.871.)

The Shaw Model "M" Printer has a printing speed range from 9 in. to 12 ft. per min. Three arc lamps, using ½x9 in. carbons, are used. Contact glass is curved to 11 in. radius by 48 in. long which provide sufficient space for 42 in. width tracings. Feeding table is 18 in. wide. The 42-in. machine is 65 in. wide, 41½ in. deep, 67 in. high and weighs approximately 650 lb. Provision may be made for adding washing and drying units.

Blueprint Binder

Wade Instrument Co., 2246 Brooklyn Sta., Cleveland, Ohio. (Vol.81,p.1006.)

A combination binder hanger that holds up to 75 blueprints. Three telescoping binder screws hold the prints. Center hook is



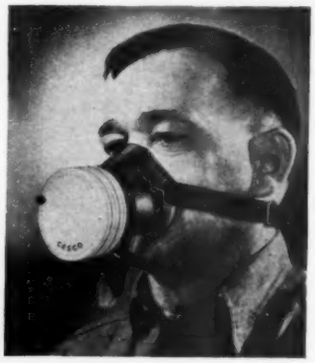
made of steel and can be turned down. Stock sizes are 18 in., 24 in., and 30 in.

Guard, Shin, Sankey

Ellwood Safety Appliances Co., 201 Fountain Ave., Ellwood City, Pa. (Vol.81,p.873.)

The Sanky aluminum-alloy shin guard may be attached to the "Improved" foot guard. The complete unit for foot pro-

tection is easily put on without special adjustment and permits free foot and leg action when in use.



Respirator, "Cesco" No. 90

Chicago Eye Shield Co., 2300 Warren Blvd., Chicago, Ill. (Vol.81,p.387.)

"Cesco" No. 90 "Healthguard" respirator has been developed for protection against Type "A" dusts (those tending to produce silicosis).

Dispenser, Salt Tablet

Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Pa. (Vol.81, p.868.)

This salt tablet dispenser is made of molded bakelite with chromium-finished metal parts. Dispenser will hold 250 tablets

Gluepot, Electric, Automatic

General Electric Co., Schenectady, N. Y. (Vol.81,p.591.)

This portable gluepot is designed to heat rapidly until a temperature of 140 to 150 F. is obtained. Temperature range is set at the factory and is accurately and automatically maintained. It has a capacity of two quarts and is available for 115- or 230-volts, a.c. or d.c. service.

Creams, Protective

Maas & Walstein Co., 420 Lexington Ave., New York, N. Y. (Vol.81,p.383.)

Two special creams have been developed to protect the hands of men who have to handle chemicals, solvents, greases and oils that destroy the protective secretions of the skin. It is claimed that use of these creams keeps the hands soft and prevents the skin from drying out and cracking.

Hose, Dust, Blower and Suction

United States Rubber Products, Inc., 1790 Broadway, New York, N. Y. (Vol.81,p.716.)

Dust hose No. P-5503 is designed for use with abrasives and for suction or for light pressures, such as that generated by a blower. It is available in three thicknesses of pure gum tube and is made in 2- to 12-in. diameters. Blower hose No. P-5509 is similar to the dust conveying hose but is designed for blowing service where fumes or gases are present.

Tool, Strapping, Model 3, Hand

Signode Steel Strapping Co., 2600 N. Western Ave., Chicago, Ill. (Vol.81,p.713.)

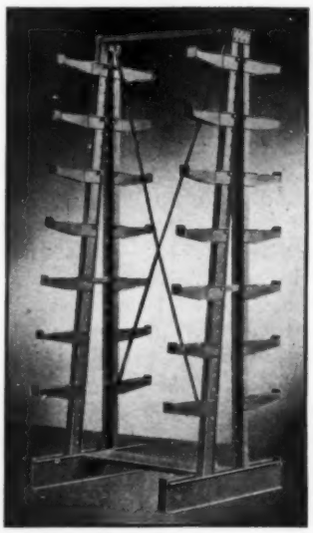
Model No. 3 direct-drive stretching tool for tensioning steel strappings around large and heavy packages has an automatic gripper action, which is controlled by the handle. This functions to free the windlass and release the strap gripper when the handle is drawn back after making the joints.

Tool, Strapping, Electric

Signode Steel Strapping Co., 2600 N. Western Ave., Chicago, Ill. (Vol.81,p.757.)

This electric strapping tool is supplied for tensioning strapping around large and heavy packages and bulk shipment of material where speed in applying the maximum tension is

necessary. An adjustable control provides the required tension automatically.



Rack, Pipe and Bar

General Fireproofing Co., Youngstown, Ohio. (Vol.81,p.225.)

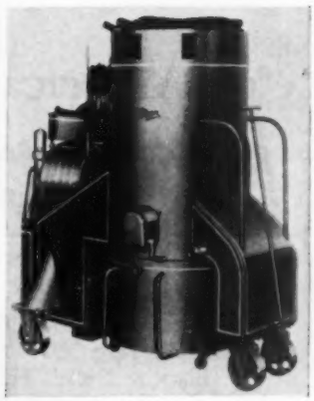
This pipe and bar rack consists of two upright assemblies made up of posts, brackets and base channels. Brackets for carrying the pipe or bars are bolted to the posts, which are punched at 3-in. intervals for space adjustment. Each bracket is designed to support a load of 2,000 lb.

Locker, "Unit-Robe"

All-Steel-Equip Co., Inc., Aurora, Ill. (Vol.81,p.675.)

"Unit-Robe" steel group-locker units will accommodate sixteen persons with a floor space re-

quirement of approximately ½ sq.ft. per person. These are made up of box-locker units, 12 in. wide, 12 in. high and 18 in. deep.



Cleaning Unit, Vacuum, Portable No. 5

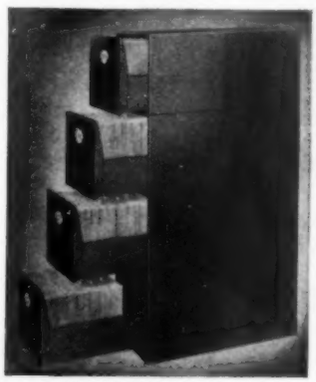
Air Appliance Div., United States Hoffman Machinery Corp., 105 Fourth Ave., New York, N. Y. (Vol.81,p.1288.)

Designed to remove large quantities of accumulated dust, the Hoffco No. 5 super-duty portable vacuum cleaning unit is claimed to be capable of several hours of continual operation on heavy deposits of dust before it is necessary to empty the container. This unit has capacity to operate two lines of 1½-in. diameter hose of different lengths simultaneously, or one line of 2-in. hose.

Case, Transfer, "Aurora"

All-Steel-Equip Co., Inc., Aurora, Ill. (Vol.81,p.303.)

Design improvements in the extra-capacity "Aurora" steel transfer case units are claimed



to give increased strength. These units have been designed to be used with other units in a storage system. Maximum drawer depth is 27⅛ in.

"Snopake"

The Skybryte Co., 1919 E. 19th St., Cleveland, Ohio. (Vol.81, p.1237.)

"Snopake" is a pale-green adhesive liquid that can either be brushed or sprayed on windows to reduce the excessive glare that is experienced during the winter months in buildings adjacent to open fields where large expanses of snow are present.

Protective Paper, Koroseal-Coated

B. F. Goodrich Rubber Co., Akron, Ohio. (Vol.81,p.756.)

Koroseal-coated paper is designed for the protection of exposed surfaces of machinery which may be attacked by salt air. The paper is claimed to be impervious to acids.

Card Record Forms, Social Security

Acme Card System Co., 8 S. Michigan Ave., Chicago, Ill. (Vol.81,p.225.)

Social Security record forms, which are based on an analytical study of the law, include the Individual Payroll Record, the Annual Payroll Summary, the Personnel Form, the Unemployment Tax Record and the Employees' Contribution Record.

Timers, Chronograph, "Multi-Chron"

M. J. Stillman Co., Inc., 116 S. Michigan Ave., Chicago, Ill. (Vol.81,p.584.)

This line of Racine "Multi-Chron" wrist chronograph timers combines a 15-jewel timepiece for recording time of day with the chronographic features of a sweep hand registering

fifth seconds or decimal minutes. Double lugs on either side of the crown allow for "take-out" time for interrupted observations and permit continuation of the sweep-hand movement without returning this hand to zero.

Calculator, Shop, "Machinist's"

Blackman & Nuetzel Machinery Co., 3713 Washington Ave., St. Louis, Mo. (Vol.81,p.1294.)

Improvement in the "Machinist's Slide Rule" consists of the addition of total time and arithmetic calculating scale. This vest pocket shop calculator is a specially graduated slide rule that will permit calculation of shop problems.

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A. C. Wickman, Ltd., Coventry, England. Automatic, five-spindle screw machines. Vol. 80, p. 792E.

Milling Machines

Societe Alsacienne de Constructions Mecaniques, Graffenstaden, (Bas-Rhin), France. "Graffenstaden" vertical millers. Vol. 81, p. 93E.

Craven Bros. (Manchester), Ltd., Reddish, near Stockport, England. Ingot milling and chamfering machine. Vol. 81, p. 312E.

Dowding & Doll, Ltd., Greycoat St., Westminster, S. W., England "Gaitzsch" hand-operated miller. Vol. 81, p. 544E.

Alfred Herbert, Ltd., Coventry, England. "Edgwick" plain miller. Vol. 81, p. 328E.

Hey Engineering Co., Ltd., Coventry, Engand. Cylinder-flange profiling machine. Vol. 81, p. 314E.

John Holroyd & Co., Ltd., Milnrow, Lancashire, England. Twist-drill fluting and relieving machine. Vol. 81, p. 418E. Commutator-segment milling machine. Vol. 81, p. 196E.

E. H. Jones (Machine Tools), Ltd., the Hyde, London, N. W., England. "C.V.A." vertical miller and die-sinker. Vol. 81, p. 273E.

C. H. Joyce, Ltd., 115, Southwark St., London, S. E., England. "Etsco" pantograph engraving machine. Vol. 81, p. 441E.

Midgley & Sutcliffe, Hunslet, Leeds, England. "Richmond" plain horizontal miller. Vol. 81, p. 93E. "Richmond" vertical miller. Vol. 81, p. 446E. "Richmond" all-geared horizontal miller. Vol. 81, p. 476E.

Muller & Montag, G.m.b.H., Leipzig, Germany. Vertical-spindle miller. Vo.. 81, p. 286E.

G. Richards & Co., Ltd., Broadheath, near Manchester, England. Vertical miller and keyseater. Vol. 81, p. 339E.

Alfred H. Schutte, Koln-Deutz, Germany. Slot and keyway miller, with oscillating cutter. Vol. 81, p. 105E.

Carl Semper & Co., Greiz, Thuringen, Germany. Engraving machines. Vol. 81, p. 353E.

A. C. Wickman, Ltd., Coventry, England. Moulton thread miller. Vol. 81, p. 299E.

Planers and Shapers

Craven Bros. (Manchester), Ltd., Reddish, near Stockport, England. Combined slotter and cross-planer. Vol. 81, p. 179E. 13½ x 12 x 27 ft. high-speed planer. Vol. 81, p. 586E.

Droop & Rein, Bielefeld, Germany. Heavy-duty horizontal slotter. Vol. 81, p. 519E.

Gebr. Heinemann, A. G., St. Georgen, Germany. Electric 16-in. crank shaper. Vol. 81, p. 208E.

Ormerod Shapers, Ltd., Hebden Bridge, England. Vertical slotter. Vol. 81, p. 298E.

Tapping & Threading Machines

B. Elliot & Co., Ltd., York Road, London, N., England. "Record" pipe and bolt threaders. Vol. 81, p. 165E.

Loewe-Gesfurel, A. G., Berlin, Germany. Bench-type tapping machine. Vol. 81, p. 180E.

Nitsche & Gunther, Rathenow, Germany. Semi-automatic sensitive tappers. Vol. 81, p. 10E.

Skodaworks, Pilsen, Czechoslovakia. Circular shaping machine. Vol. 81, p. 408E.

Miscellaneous Machines

W. & T. Avery, Ltd., Soho, Birmingham, England. Izod impact testing machine. Vol. 81, p. 442E. Hydraulic testing machine. Vol. 81, p. 471E.

C. Baker, 244 High Holborn, London, W.C., England. Wear and lubricant tester. Vol. 81, p. 204E.

Bowen Instrument Co., 9, Newton Road, Leeds, England. "Humfrey" hand-operated tensograph, Vol. 81, p. 489E.

Bruntons (Musselburgh), Ltd., Musselburgh, Scotland. Haigh-Robertson fatigue tester. Vol. 80, p. 778E.

Georg Kesel, G.m.b.H. Kempton, Bavaria, Germany. Universal circle dividing machine. Vol. 81, p. 504E. Longitudinal dividing machine. Vol. 81, p. 532E.

ACCESSORIES

W. Frost & Co., 1 St. Nicholas Building, New Castle-on-Tyne, England. "Versa-vice" bench and machine vise. Vol. 81, p. 32E.

Gent & Co., Ltd., Leicester, England. "Tangent" electric process timer. Vol. 81, p. 18E.

Horace Green & Co., Ltd., Cononley, Keighley, England. Coolant pump. Vol. 81, p. 374E.

Gebr. Harnisch, Gera, Germany. Work-clamping and indexing fixture. Vol. 81, p. 148E and 207E.

Thos. P. Headland, Ltd., Pearman St., London, S.E., England. "Masseeley" radial grinding attachment. Vol. 81, p. 442E.

Alfred Herbert, Ltd., Coventry, England. Automatic-reversing tapping attachment. Vol. 81, p. 352E.

W. H. Marley & Co., 21, Compton Terrace, London, N., England. Quick-acting machine vises. Vol. 81, p. 363E.

Mason, Seeley & Co., Ltd., 14 Howick, Place, London, S.W., England. Radial grinding attachment. Vol. 81, p. 632E.

Pulsometer Engineering Co., Ltd., Reading, Berkshire, England. Motor-driven coolant pumps. Vol. 81, p. 385E

S. Russell & Sons, Ltd., Leicester, England. Interlocking vises for cold-sawing. Vol. 80, p. 746E.

John Stirk & Sons, Ltd., Halifax, England Universal relieving planer head. Vol. 80, p. 759E.

Wearden & Guylee, Ltd., Archer Road, Sheffield, England. "Wharton" automatic-reverse tapping head. Vol. 81, p. 151E. "Wharton" drill speeder. Vol. 81, p. 151E.

J. Samuel White, Ltd., Cowes (I. of W.), England. "Clinsol" oil strainer. Vol. 81, p. 352E.

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Broom & Wade, Ltd., High Wycombe, England. Pneumatic bench-mounted riveter. Vol. 81, p. 108E. Column-mounted yoke riveters. Vol. 81, p. 236E. Portable pneumatic riveter. Vol. 81, p. 287E.

F. J. Edwards, Ltd., 359 and 361, Euston Road, London, N.W., England. "Besco" 6 ft. guillotine shear. Vol. 81, p. 3E. 70-ton, inclinable press. Vol. 81, p. 441E. 70-ton, 120-in. press brake. Vol. 81, p. 473E.

J. Emrich Maschinenfabrik, Muhlacher, Wurttemberg, Germany. Press and draw-hammer. Vol. 81, p. 135E.

Halda Taximeter Co., Ltd., Brandon Road, London, N., England. "Pullomax" column-type shears. Vol. 81, p. 616E. "Shearomax" bench-type shears. Vol. 81, p. 616E.

Hilmor, Ltd., 65, Southampton St., King's Cross, London, N., England. Semi-automatic tube bender. Vol. 81, p. 425E. Portable tube bender. Vol. 81, p. 450E.

Hunton, Ltd., 114 and 116, Euston Road, London, N.W., England. Bench-type rotary shearing machine. Vol. 80, p. 717E.

W. Kennedy, Station Works, West Drayton, England. Flat-strip bending machines. Vol. 81, p. 424E.

Henry Pels & Co., Ltd., Berlin, Germany. 900-ton, double-standard eccentric press. Vol. 81, p. 89E. Combination plate shear and punch. Vol. 81, p. 452E.

J. Rhodes & Sons, Ltd., Wakefield, England. Automatic, inclined stagger press. Vol. 81, p. 21E.

Sweeney & Blockside, Saltley, Birmingham, England. No. 12 geared 60-ton punch press. Vol. 81, p. 20E.

Taylor & Challen, Ltd., Birmingham, England. 100-ton crank press. Vol. 81, p. 5E. 70-ton friction screw press. Vol. 81, p. 23E.

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Liptak Furnace Arches, Ltd., 59, Palace St., London, S.W., England. Air-jacketed heat-treating furnace. Vol. 80, p. 717E.

Wild-Barfield Electric Furnaces, Ltd., North Road, Holloway, N., England. Vertical heat-treating furnaces. Vol. 81, p. 3E. High-speed steel hardening furnace. Vol. 81, p. 22E.

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TOOLS AND GAGES

G. H. Alexander Machinery, Ltd., Coleshill St., Birmingham, England. "Galex-Packard" high-speed reamers. Vol. 81, p. 273E.

J. E. Baty & Co., 39 Victoria St., London, S.W., England. "Lindley" extensometer. Vol. 80, p. 779E.

British Precision Diamond Tools, Ltd., Melbourne Road, Wallington, Surrey, England. Line of diamond-tipped tools and holders. Vol. 81, p. 150E.

Burton, Griffiths & Co., Ltd., Birmingham, England. "Solex" pneumatic micrometer. Vol. 80, p. 771E.

Cambridge Instrument Co., Ltd., 45, Grosvenor Place, London, S.W., England. Automatic gaging and sorting machine. Vol. 80, p. 776E. Universal vibrograph. Vol. 80, p. 777E. Universal measuring engine. Vol. 81, p. 205E.

Catmur Machine Tool Corp., Ltd., Caxton St., Westminster, S.W. England. "John Bull" dial-gage testing set. Vol. 81, p. 518E.

Fry's (London), Ltd., 24 and 25, King St., London, E., England. "Enox" tube cutter and reamer. Vol. 81, p. 618E.

Societe Genevoise, Geneva, Switzerland. Profile projector for gear-generating cutters. Vol. 81, p. 201E. Microvibrometer, Vol. 81, p. 222E.

C. Hearson & Co., Ltd., 27, Mortimer St., London, W., England. Universal camera-microscope. Vol. 81, p. 203E.

Adam Hilger, Ltd., 98 King's Road, London, N.W., England. Enlarger for surface inspection. Vol. 81, p. 204E. "Dekkor" angle checker, Vol. 81, p. 205E.

Johnson Machine Co., Nursery Road, Mitcham, Surrey, England. "Dwarf" portable Brinell hardness tester. Vol. 81, p. 135E.

E. Leitz, Wetzler, Germany. Measuring microscope. Vol. 81, p. 88E. Profile projector. Vol. 81, p. 177E.

J. Neill & Co. (Sheffield), Ltd., Sheffield, England. "Eclipse" hacksaw blade selector. Vol. 81, p. 518E.

Salford Electrical Instruments, Ltd., Silk St., Salford, England. Electric micrometer. Vol. 81, p. 203E.

Carl Zeiss, Jena, Germany. Standard gage blocks. Vol. 81, p. 164E.

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John Pickles & Son (Engineers), Ltd., Hebden Bridge, England. Disk and bobbin sanders. Vol. 81, p. 261E.

Tilghman's Patent Sandblast Co., Ltd., Broadheath, near Manchester, England. "Wheelabrator Tablast" cleaner. Vol. 81, p. 452E.

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Hancock & Co. (Engineers), Ltd., Progress Way, Croydon, England. No. 2 universal oxygen-jet profiler. Vol. 81, p. 2E. Universal three-head oxygen-jet cutting machine. Vol. 81, p. 425E. Automatic oxygen-jet cutting machine. Vol. 81, p. 425E.

Hey Engineering Co., Ltd., Coventry, England. Stelliting machine for hard-facing valves and valve seats. Vol. 81, p. 299E.

Holden & Hunt, Old Hill, Staffordshire, England. High-speed 25 kva. spot welder. Vol. 81, p. 4E.

New Process Welders, Ltd., Scott's Road, Southall, England. Automatic rim welder. Vol. 81, p. 3E. Fixed-head 35 kva. spot welder. Vol. 81, p. 19E. General-purpose 75 kva. butt welder. Vol. 81, p. 424E.

Soag Machine Tools, Ltd., 7, Juxon St., Lambeth, S.E., England. Flash butt-welding machines. Vol. 81, p. 426E.

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Crofts (Engineers), Ltd., Bradford, England. "ItestION" high tensile strength cast irons. Vol. 81, p. 12E.

Mond Nickel Co., Ltd., Thames House, Millbank, S. W., England. "Ni-Tensyl" high-duty nickel cast iron. Vol. 80, p. 760E.

Roulements a Billes Miniatures S. A., Bienne, Switzerland. Miniature ball bearings. Vol. 81, p. 287E, 298E.

A. Schrader's Son (div. of Scovill Mfg. Co.), Tyburn Road, Erdington, Birmingham, England. Hydraulic pressure gage. Vol. 81, p. 503E.

ELECTRICAL EQUIPMENT

General Electric Co., Ltd., Kingsway, London, W. C., England. "Motorstar" combined motor and starter unit. Vol. 80, p. 729E.

Higgs Motors, Ltd., Witton, Birmingham, England. Fractional hp. motors. Vol. 80, p. 745E.

Laurence Scott & Electromotors, Ltd., Norwich and Manchester, England. "Red Band" ⅛ to 1½ hp. a.c. motors. Vol. 80, p. 718E.

Societe Tubest, Fere-en-Tardenois, France. "Chilowski" light relay. Vol. 81, p. 313E.

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David Brown & Sons (Huddersfield), Ltd., Huddersfield, England. "Radicon" BH-type bevel-gear speed reducers. Vol. 81, p. 373E. "Radicon" inverted-worm speed reducers. Vol. 81, p. 603E.

Crofts (Engineers), Ltd., Bradford, England. Ball-operated, multiple-disk friction clutch. Vol. 80, p. 793E. Variable-speed transmission. Vol. 81, p. 634E.

William Kenyon & Sons, Ltd., Dunkinfield, near Manchester, England. Short-center rope drives. Vol. 81, p. 32E.

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Silentblock, Ltd., Victoria Gardens, London, W., England. Large, cushion-type flexible coupling. Vol. 81, p. 396E.

F. Wigglesforth & Co., Ltd., Shipley, England. "Vari-Pitch" V - belt sheaves. Vol. 81, p. 109E.

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Broom & Wade, Ltd., High Wycombe, England. "Broomwade" miniature pneumatic hand drill. Vol. 81, p. 462E. "Broomwade" portable pneumatic riveter. Vol. 81, p. 589E.

Climax Rock Drill & Engineering Works, Ltd., Carn Brea, Cornwall, England. "Climax-Wodack" electric hammer-drill. Vol. 81, p. 408E.

Desoutter Bros., Ltd., The Hyde, Hendon, N.W., England. Electric portable corner drill. Vol. 81, p. 22E. Electric portable hand grinder. Vol. 81, p. 22E. "Mighty Atom" portable electric drills and shears. Vol. 81, p. 451E.

General Electric Co., Ltd., Kingsway, London, W.C., England. Portable electric drills. Vol. 81, p. 503E.

Grimston Electric Tools, Ltd., 138, Lever St., London, E.C., England. Portable electric shears. Vol. 81, p. 561E.

Lorant & Co., Ltd., 98 Croydon Road, London, S.E., England. Flexible-shaft grinders. Vol. 81, p. 451E.

J. Lucas, Ltd., Great King St., Birmingham, England. "Rotax" ¼-in. portable electric drill. Vol. 81, p. 23E.

J. Neill & Co. (Sheffield), Ltd., Sheffield, England. "Eclipse" quick-release hand magnet. Vol. 81, p. 18E.

Van Dorn Electric Tools, Slough, Bucks, England. "Junior" ⅛–⅜ in. capacity electric drills. Vol. 81, p. 20E.

S. Wolf & Co., Ltd., Hanger Lane, Ealing, London, W., England. 6-in. electric hand grinder. Vol. 81, p. 19E.

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Asea Electric, Ltd., Fulbourne Road, Walthamstow, E., England. Electric Hoists. Vol. 81, p. 533E.

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Broom & Wade, Ltd., High Wycombe, England. Single-cylinder air compressor. Vol. 81, p. 373E.

J. Broughton, Vere St., Birmingham, England. "Autoclose" wood-turning guard. Vol. 81, p. 5E. "Grippa" automatic punch-press guard. Vol. 81, p. 5E.

Lodge Cottrell, Ltd., Birmingham, England. "Aerex" centrifugal dust collector. Vol. 81, p. 119E.

General Electric Co., Ltd., Kingsway, London, W.C., England. Low-voltage local lighting for machine tools. Vol. 80, p. 759E. Electric exhaust fans. Vol. 81, p. 532E.

J. Halden & Co., Ltd., 8, Albert Square, Manchester, England. Continuous, electric photo-copying machine. Vol. 81, p. 472E.

Hick, Hargreaves & Co., Ltd., Bolton, England. Rotary air compressors. Vol. 81, p. 419E.

Mek-Elek Engineering, Ltd., 16, Douglas St., Westminster, S.W., England. Local lighting units, flexible. Vol. 81, p. 490E.

Roberts, Black & Co., Ltd., Bridge St., Manchester, England. "Steelpact" all-steel shop furniture. Vol. 81, p. 18E.

J. H. Sankey & Son, Ltd., Aldwych House, London, W.C., England. "Fibreen" waterproof, reinforced wrapping paper. Vol. 81, p. 178E.

J. P. Udal, Pershore St., Birmingham, England. Automatic punch-press guard. Vol. 81, p. 4E.

NEWS OF THE INDUSTRY

A.M.A. Personnel Division Will Look for Means to End Labor Strife

More than a dozen leaders in personnel work will speak on various aspects of the "Reconstruction Phase" in industrial relations

NEW YORK—The annual conference of the Personnel Division, American Management Association at the Palmer House, Chicago, Feb. 15-17, will start with the premise that management and labor are in a period of mutual adjustment to end industrial strife. This year's conference will take as its theme the "Reconstruction Phase" in industrial relations, and is for the purpose of determining how progress can be made toward industrial peace. The program follows:

February 15

Tuesday morning

"The Reconstruction Phase of the Employer-Employee Relationship" by Mr. Spates.

Tuesday afternoon

Topic—"The Importance of the Supervisor in Labor-Relations Policies".

"Improving the Foreman-Worker Relationship" by T. G. Graham, vice-president, the B. F. Goodrich Co.

"Effective Supervisory Training" by A. B. Gates, director of training, Eastman Kodak Co.

"The Foreman's Place in an Employee Educational Program" by L. A. Appley, supervisor of training and education, Socony-Vacuum Oil Co.

Tuesday evening

Annual Dinner

February 16

Wednesday morning

"A New Concept by Capital of Labor's Relationship in Industry" by H. L. Nunn, president, Nunn-Bush Shoe Co.

"Union Agreements and Contracts" by Ralph A. Lind, labor relations counsel, Stevenson, Jordan & Harrison.

Luncheon meeting

"The Labor Point of View" by a representative of NLRB.

Wednesday afternoon

"Employee Representation and Independent Unions—Evolution and Status" by Albert S. Regula, Industrial Relations Counselors, Inc.

"Handling Labor Relations with the Aid of Governmental Agencies" by Russell L. Greeman, assistant manager, Department of Manufacture, Chamber of Commerce of the United States.

February 17

Thursday morning

Topic—"Clearing up Employee Misinformation"

"Meeting the Employee's Challenge" by John H. Goss, vice-president, Scovill Manufacturing Co.

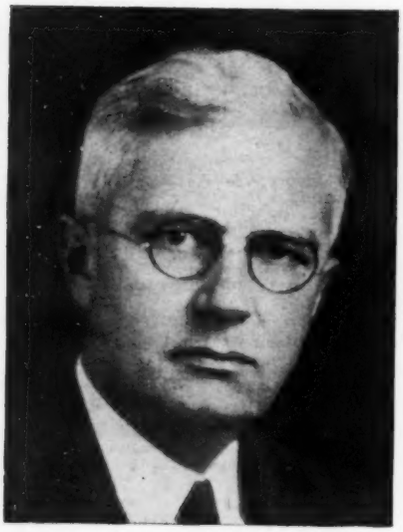
"Special Publications for Employees".

"Employee Education and Counseling Programs" by M. L. Putnam, chief of personnel research and training division, Western Electric Co., Inc.

Thursday afternoon

"Application of Psychology in Industrial Relations" by Dr. Morris S. Viteles, director of personnel research and training, Philadelphia Electric Co.

"Sound Wage Payment Policies" by A. L. Kress, director, industrial relations department, National Electrical Manufacturers Association.



A. B. GATES

M. L. PUTNAM

VERNON E. WALTERS

V. E. Walters Becomes Kent-Owens Manager

Vernon E. Walters has joined the staff of Kent-Owens Machine Co. as factory manager. He comes to Kent-Owens from the Inland Manufacturing Division, General Motors Co., Dayton, where he was master mechanic. For the past eighteen years, Mr. Walters has been allied with the automotive industry, serving both General Motors and Chrysler. Prior to that he was engaged in the manufacture of fire arms with the Savage Arms Co. and the Ross Rifle Co. His extensive experience in tooling, processing, and organization of plant schedules gives Mr. Walters a valuable background for supervision of Kent-Owens plant operations.

Paul K. Rogers, Skinner Chuck Head, Dies in Fall

Paul K. Rogers, president and treasurer of the Skinner Chuck Co., New Britain, Conn., accidentally fell from a fourth-story window in the factory and died before reaching a hospital. Mr. Rogers went to

PAUL K. ROGERS

work with Skinner after leaving Princeton University and worked his way up through the cost, purchasing and bookkeeping departments. He was treasurer for many years and was made president in 1931. Mr. Rogers was fourth president of the concern, being preceded by his grandfather, Charles F. Glover and the late Edward J. Skinner. He leaves one son, Paul K. Rogers, Jr.

Foreign Orders Lift Machine Tool Index

A 38 per cent increase in foreign orders during December as compared with November saved the total index from dipping below that for the earlier month. Overseas orders reached a value of 89.2, nearly equal to the high for the year established in September, and accounted for 63 per cent of the total business for the month, according to the National Machine Tool Builders Association.

Domestic business reached the low point for the year. The index of 53.5 is off ten points from the preceding month, a drop of 16 per cent. The high point for the year was established in April when orders from home buyers stood at 232.5. Although a progressive decline has taken place since then, the picture for the year as a whole is good. The average of domestic orders is 129.1 for the year, compared to an average of 100 for 1926, and the average total index is 186.9 which is 20 per cent better than the 1929 total average of 155.8. Foreign orders were 31 per cent of the total placed during the year, were better than during 1929, and thus bolstered 1937 considerably.

Index of Machine Tool Orders

Based on Volume o. Shipments for 1926

Month	Index of Orders: Domestic	Foreign	Total	3 Months' Average Index	% Foreign to Total Orders
1937— January	156.1	44.0	200.3	201.7	22
February	122.4	42.8	165.2	207.7	26
March	172.1	39.5	211.6	192.4	18
April	232.5	50.0	282.5	219.8	18
May	161.4	47.1	208.5	234.2	22
June	137.6	54.2	191.8	227.6	28
July	115.4	55.7	171.1	190.5	32
August	129.5	50.3	179.8	180.9	28
September	119.0	91.7	210.7	187.2	42
October	89.1	62.9	152.0	180.8	43
November	63.3	64.4	127.7	163.5	50
December	53.5	89.2	142.7	140.8	63
Average	129.1	57.8	186.9	.....	31

Distribution of Orders

Average Indexes of Individual Companies Based on 1926 Level of Business	Companies In Per Cent of Total Number Reporting: 1936 1st Quar.	1936 2nd Quar.	1936 3rd Quar.	1936 4th Quar.	1937 1st Quar.	1937 2nd Quar.	1937 3rd Quar.	1937 4th Quar.
200–up	13.0	17.2	15.8	28.4	31.6	38.5	33.4	23.0
100–199	24.6	32.6	28.8	30.2	32.8	29.1	30.2	23.2
60– 99	22.4	19.0	22.9	19.5	16.4	15.1	15.7	18.6
20– 59	26.5	21.8	21.7	15.2	12.2	11.4	12.7	22.0
Less than 20%	13.5	9.7	10.8	6.7	7.0	5.9	8.0	13.2

General Motors Opens Plant for Small Diesels

DETROIT—General Motors has announced plans for the establishment, for the first time, of mass production and sale of small, lightweight, two-cycle diesel engines for all purposes. R. K. Evans, vice-president of G.M. in charge of diesel development, announced that the new engines are "little brothers" of the large type that now power mainline high-speed diesel passenger trains. Operations have been confined previously to the building of the larger engines of from 600 to 1,200 hp., but the new engines will vary in size down to a one-cylinder, 22-hp. model.

Engines will be built in three General Motors factories at Detroit, Cleveland and LaGrange, Ill. The new factory of the Detroit Diesel

Daylight Diesel Factory—**Production of one, three, four and six-cylinder engines by the Detroit Diesel Engine Division, General Motors Corp., will be undertaken in a modern plant with high ceilings, a large amount of window space and a light-reflecting treatment on the roof and framework**

Engine Division was placed in operation last week and will produce the smaller engines from 22 to 160 hp. and with from one to six cylinders. The Cleveland Diesel Engine Division (formerly the Winton Engine Manufacturing Corp.) will manufacture a full line of medium-size engines ranging from 200 to 400 hp. A new engine factory at the Electro-Motive Corp. Diesel locomotive plant at LaGrange, Ill., will be in operation within a few months for building larger engines.

In connection with the Detroit factory, a new diesel test laboratory was opened, said to be the largest and the most completely equipped in the world for exclusive diesel study.

Sales in all fields except railroad motive power will be through the Diesel Engine Division of the General Motors Sales Corp. with headquarters at Cleveland. Engines will also be sold to other manufacturers who will adapt them in tractors, and road building machinery.

Matschoss Succeeded by Kolzow as VID Director

After 32 years of work with the Verein Deutscher Ingenieure, Conrad Matschoss has retired as director on his own request. Dr. Matschoss bears many titles and has received honors from his own country and from engineering bodies in other countries. He is well known by many American engineers who have met him here or in Berlin.

H. Schult, president of the VID has announced that Dr. Matschoss will be succeeded by Herr Stadtbaurat Dr. Hans Kölzow.

W. N. Gallagher Heads Washing Machine Mfgrs.

During the annual meeting of the American Washing Machine Manufacturers' Association in Chicago, the following officers were elected: President—W. Neal Gallagher, president, Automatic Washer Company; first vice-president—R. D. Hunt, executive vice-president, Dexter Company; second vice-president—I. N. Mettitt, vice-president of Meadows Mfg. Company; third vice-president—R. C. Stuart, president, Barlow & Seelig Mfg. Company; treasurer—William H. Vos, president, Voss Bros. Mfg. Company. The industry's 1937 sales of household washers and ironers will be revealed as within less than 5 per cent of the 1936 record total of 1,900,000 units, Mr. Gallagher announced.

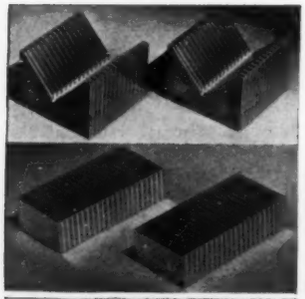
SAE Annual Meeting Draws 1,100 Persons

Foreshadowing numerous changes in automobiles to enhance safety were the criticisms advanced for 1938 designs by motor vehicle administrators from United States and Canada during the annual meeting of the Society of Automotive Engineers in Detroit, January 10-14. Most of these men agreed that poor visibility is one of the outstanding unsatisfactory points about 1938 cars, but they disagreed on the desirability of using governors to control maximum speeds. Air conditioning, acoustical research, performance requirements for trucks, cylinder wear, fuels and diesel engines were subjects that attracted the interest of more than 1,100 members and guests at the meeting.

T-P

5-STAR NEWS REVIEW

In 1937, the products shown here were introduced under the T-P trade-mark and guarantee. They present important opportunities to simplify and expedite production and inspection . . . as well as to establish new limits of accuracy. Full information on any or all of them for the asking. Write.

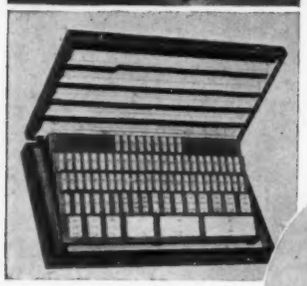


★ ***Magnetic Parallels and V-Blocks*** widen range of set-up of Taft-Peirce Superpower Magnetic Chucks. Universal in application.

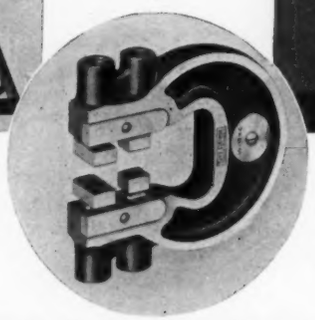
Sine Blocks combine the features of a 5" sine bar and a right angle iron. Top surface ground parallel within .0001" to center line of sine plugs. ★

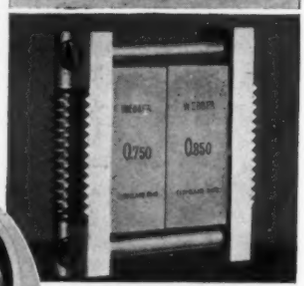
Adjustable Thread Snap Gage has a true form of thread ground in faces of anvils . . . an exclusive feature. Anvils furnished for any pitch, any percentage of thread engagement.

★



★ ***Webber Gage Blocks*** in low-cost sets guaranteed equal or superior to any blocks made to Class B tolerances.





★ ***Threaded Setting Blocks.*** Used with Gage Blocks to produce a section of any pitch diameter over 1". Furnished in pairs, in any pitch.

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DETROIT LETTER

Makers cut 1938 production estimates to 3,000,000 units . . . Dealers glutted with 1,000,000 used cars

DETROIT—The present automotive situation bears an unhappy resemblance to that in the early days of 1930. It will be remembered that the bulging production of 5,600,000 units in 1929 was whittled down to around 3,500,000 units during 1930 and dealers were stuck with a record number of used cars early in '30.

Last year car output slightly topped the five million mark and unless the industry's executives are unduly pessimistic, the total this year won't be much more than three millions. Never before, not even in 1930, have dealers' lots been so clogged with used cars, the estimates for the country being perilously close to the million figure. One authority says that new car dealers have on hand 700,000 used passenger cars and 150,000 used trucks. One must add to those figures the number of cars in the possession of used car dealers. And the trouble is that few of these cars now are being sold.

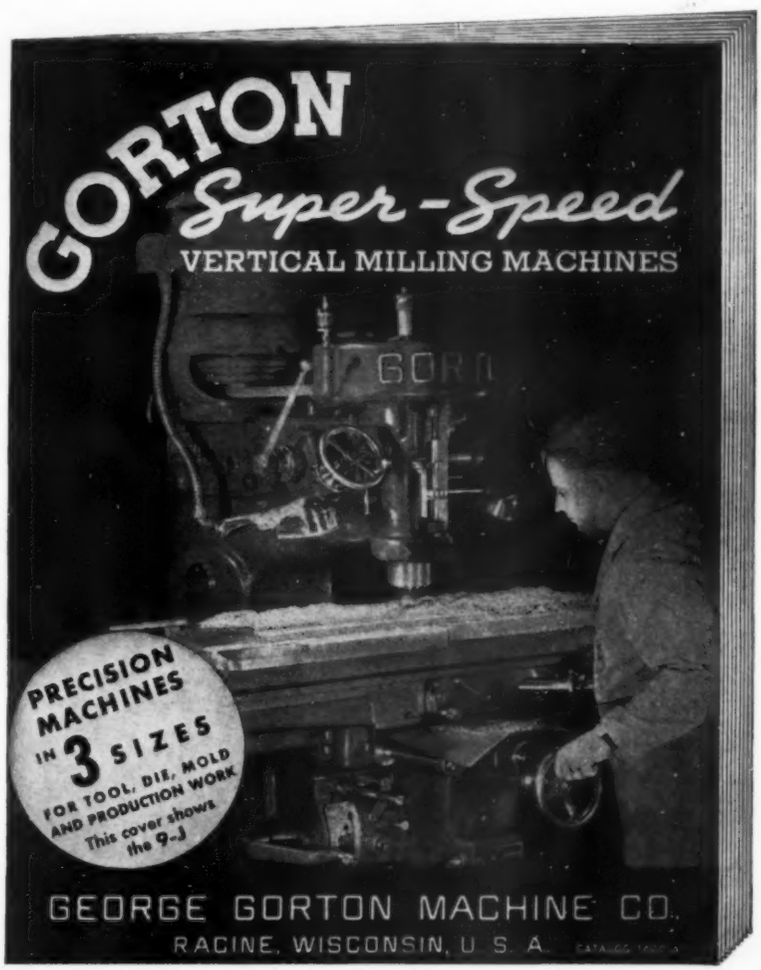
Tough for Dealers

Further complicating the situation is the sizable volume of repossessed cars thrown on the market by finance companies. Many of these vehicles are being shipped to small towns to be sold, thus making conditions doubly tough for local dealers. Factories and dealers feel a certain sense of helplessness about the present tangle. They don't believe that any marked improvement will occur until early Spring.

Detroit psychologically is in the depths just now. Mayor Reading claims 150,000 men have been laid off, with the relief problem rapidly becoming acute. Families again are "doubling up" their living quarters. Fewer cars are seen on the streets and parking lots no longer are crowded. Despite these depressing factors, local industrial employment on Jan. 15 stood at 88.6 compared with 74.5 on Dec. 31 and probably will rise to 90 by the end of the month (it was 114.4 on Jan. 15 a year ago).

Plenty of plans are afoot by the industry. The big companies are convinced that they must invade the Willys field not later than next fall and at least two of them have small cars ready. One of these cars is of revolutionary design with independent suspension of all four wheels and the frame eliminated. The short propeller shaft is a solid steel casting. The wheelbase is said to be 102 inches. The car will deliver in Detroit for less than $500. The design is such that space inside the body is relatively large.

It is no longer a secret that Ford has a V-eight car ready to drop into the price class between the present de luxe V-eight and the Lincoln-Zephyr. According to reliable reports, this car will be of more



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extreme tear-drop design than any car yet offered. Just when Ford will decide is the opportune time to put it on the market is anybody's guess. This will give Ford coverage in the lower medium-price range. Much of the huge expansion program now under way at Rouge is known to be in anticipation of a widening of Ford's line of cars.

Three new engines are reported in the offing for '39. That should mean some nice equipment orders soon. Independent springing is apt to be adopted more widely. A large automobile company is giving consideration to a plan for erecting a new engine and axle manufacturing plant west of the Mississippi to be ready for operation during the '39 season.

How much Chrysler will spend for new equipment in the coming months is as yet undetermined. One fact appears certain: the industry made only superficial changes in '38 models and some observers believe that the lack of new features contributed to the current stalemate in the retail market. Therefore major changes, involving heavy tooling expenses, are due for 1939. Anyway, a forecast of tough sales prospects ahead always stimulates car makers to tempt buyers with new designs.

G.M. Diesel Plant

With a blare of publicity trumpets General Motors opened its Diesel engine plant at Detroit the past week. From a tooling standpoint the most interesting machine is a shaper equipped with multiple-formed tooling for machining the helical rotor. The fixture is provided with a reciprocating rotary feed synchronized with the movement of the shaper head. General Motors is still buying machinery and tools for diesel production mostly at the Winton factory at Cleveland and the Elecrto-Motive factory at LaGrange, Ill.

A check-up among members of the American Society of Tool Engineers in mass production plants in the Detroit districts shows that at least $15,000,000 will be required during 1938 for new manufacturing equipment and machine tools and the total may go as high as $65,000,000. These figures do not include materials for processing, non-production materials or perishable items.

Detroit Notes

The U.A.W. recently gained a few members in Flint by urging members to wear their union buttons when applying for relief, giving the impression that unionists get preferential treatment. That propaganda was soon stopped by public authorities. . . . Mayor Reading of Detroit has ordered relief agencies to stop permitting the U.A.W. to investigate applications. . . . General Motors has just backed out of its agreement of last April 12 with the U.A.W. providing for a representative for every 400 workers on plant bargaining committees and giving such representatives prior seniority during layoffs.

There is a tendency among parts factories to reduce wages. President Martin of the U.A.W. is not objecting to such cuts, emphasizing that there is "no objection to shifting men to lower wage jobs during layoff periods to maintain seniority." . . . General Motors finally has awarded contract for erection of Sunlight Electric plant at Warren, Ohio. . . . The Ford people feel pretty good about the

Photo Ewing Galloway

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Institute of Public Opinion's poll which shows 64 per cent of the people siding with them in their fight against the C.I.O.

Sheet steel inventories are reaching the desired lower level, since current releases are gradually approximating current demands by body plants. . . . There is no tendency yet to give releases for more than 30 days at a time. . . . Auto production has picked up a bit with the reopening of some Chrysler plants on a part-time basis and of Graham. . . . Hudson's output is almost all of the 112 while dealers are being stocked. . . . Ford is assembling 4,000 cars a day, but parts production at Rouge is not that high.

General Motors Truck has purchased machine tools for its cylinder block line in connection with its new six-cylinder motor which will be used in its light trucks. Other equipment is yet to be bought. . . . Annual earnings of G.M. workers for 1937 averaged $1,650 compared with $1,440 in 1929 despite shorter hours. . . . No rear-engine cars are expected in '39.

W. J. Kelly Sees Poor First Half for Machinery

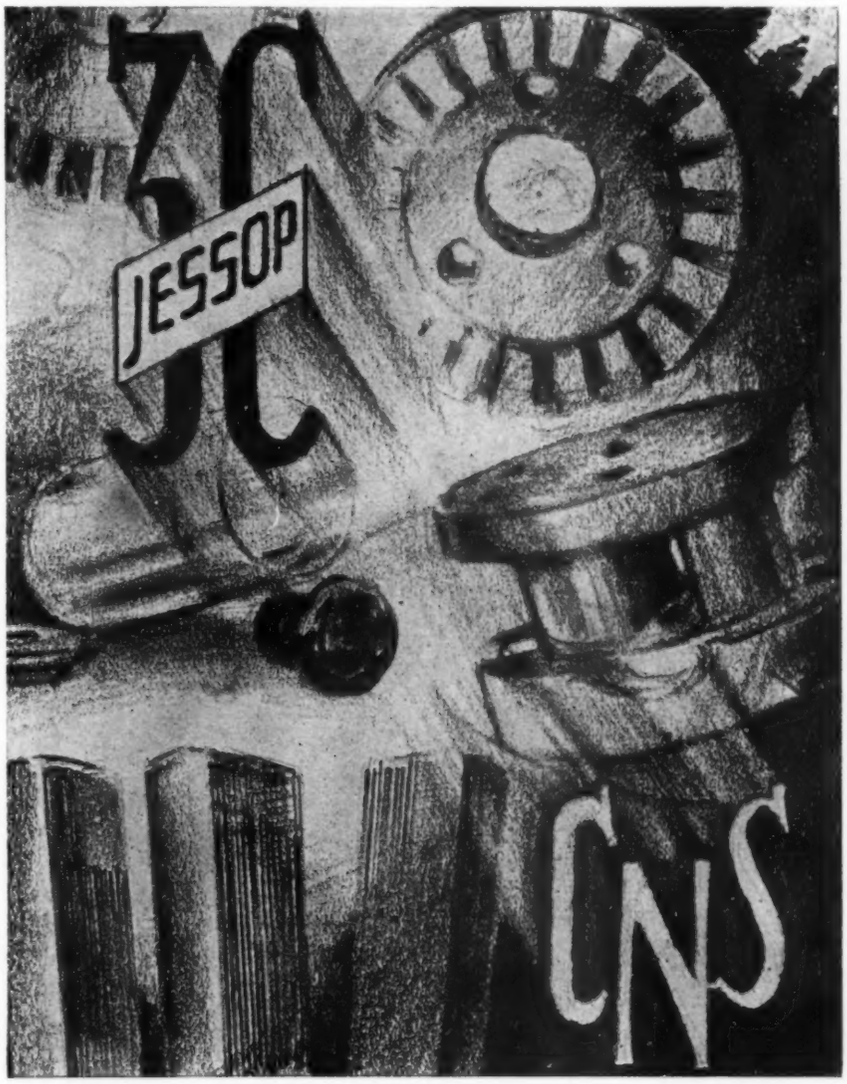
WASHINGTON — Machinery orders in the last quarter of 1937 dropped 30 per cent below the preceding quarter, William J. Kelly, president of the Machinery Institute, reported at the Senate hearing on unemployment and relief. Employment, he said, was down 20 per cent. The figures were compiled by the Institute from a questionnaire survey begun December 30. It covers companies employing more than a million workers.

"The precipitous drop in machinery business reflects the lack of confidence which is preventing investment in all durable goods," said Mr. Kelly. "Without advancement of the durable goods industries, national recovery is impossible."

The concensus of manufacturers reporting in the Institute survey was that machinery business in the first half of 1938 would be about 41 per cent of the amount for the first half of 1937. Production and employment are being maintained at their present levels almost entirely by a backlog. New orders are below level of current output.

"Testimony of representatives of a wide range of interests at this hearing," he said, "indicates that we have reached the point in our analysis of unemployment where there is general agreement that the durable goods industries are the source from which employment must come. Unemployment has been in the durable goods industries. It is there now and is mounting rapidly, and the leaders in other fields now know and have said that sustained prosperity cannot come to their industries and to the country as a whole until recovery is achieved in durable goods."

Mr. Kelly said there are three essentials to the revival of the durable goods industries: (1) Confidence in a favorable long-range view on the part of the man who owns or operates an enterprise and confidence of the investor who ventures further with the savings with which business is maintained and expanded; (2) an open and free-flowing money market; and (3) equitable and reasonable taxation



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WATCHING WASHINGTON

Business still doubtful on New Deal overtures . . . Halt in spending now seems forgotten

WASHINGTON—"Love me—love me not." Daisies may tell, but business is having a hard time to find the answer from the New Deal Administration. Presidential approval of the suggestions submitted by the Business Advisory Council, headed by W. Averell Harriman, was taken as a conciliatory gesture contrasting sharply with his denouncement of all holding companies only five days previous. The council expressed sympathy with many of the President's objectives, gave assurance of its willingness to cooperate in bringing about a "more secure economy," but following the lead of other business groups recently received at the White House, urged clarification of Administration attitudes on holding companies, government competition with public utilities, relations between capital and labor, wage-hour legislation, and recommended modification of the undistributed profits and capital gains taxes.

It still remains to be seen whether any more comes out of this conference than from that in the preceding week, which included both representatives of business and labor, or from the several meetings with utility executives. The President radiates such geniality and voices so many polite expressions that conferences often conclude on a note of optimism the visitors coming out without realizing that had gotten nowhere.

Example of Disillusionment

Wendell L. Willkie, president of the Commonwealth and Southern Corporation, is a fine example of disillusionment after the glad hand and cheery word at the White House had worn off. His answer to the President's ultimatum that holding companies must eventually be eliminated was to demand that the government buy his vast utility system facing "ruin" under the new deal. This was countered by the somewhat ridiculous suggestion of David E. Lilienthal, director of the Tennessee Valley Authority, who rejected Willkie's offer and suggested instead that cities buy part of the operating companies while federal ownership to TVA would be extended by the purchase of other parts. The obvious impracticability and injustice to the owners of dismembering a utility system was promptly pointed out.

Among the recommendations of the Business Advisory Council was that there be no further cheapening of the dollar. The history of destructive depreciation of currency in other countries shows that the harm is done, not by governmental edicts, but rather by progressive dissipation of the nation's credit because of spending in excess of income. A few items indicate that the recently talked of effort to balance the budget is all but forgotten. The Treasury recently revealed that up to January 1 the

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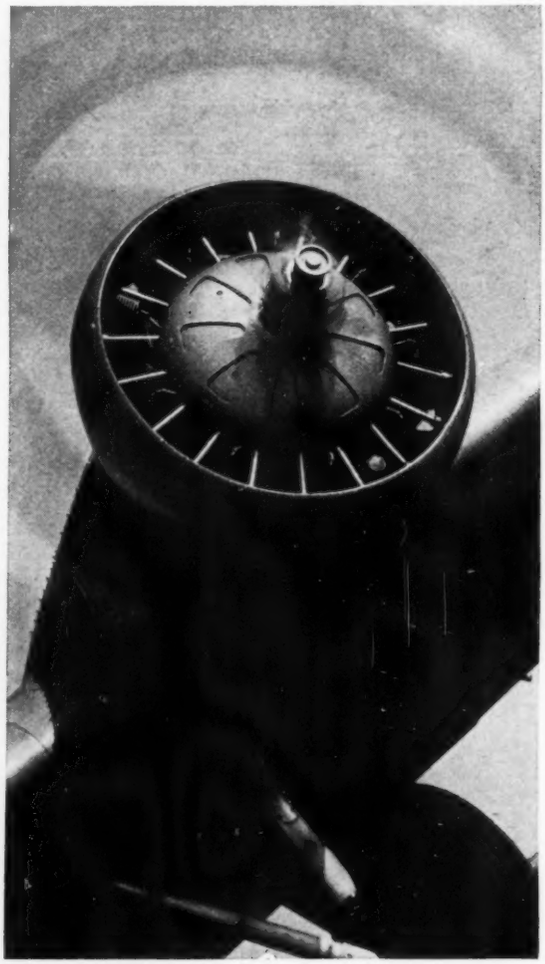

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PLANTS FROM PROFITS

When the pending tax law is finally enacted, it is virtually certain that manufacturers spending money for new machinery will not have to pay an undistributed profits tax on that money. This is just about the safest predcition that can be made about the present congress.

If there could be a secret vote, congress would repeal the tax on undistributed earnings altogether. But there cannot be any such thing; politics, saving the President's face and the danger from strongly pro-Roosevelt opponents in primaries will save some shred of the tax. It may be a big shred and it may be a little one, but congress is determined to do something to aid business, and the one thing that appeals to almost everyone on Capitol Hill is to exempt expenditures for new machinery from this super-tax.

Congressmen would like to go so far as to exempt also additions to plant. This is far more doubtful. It runs much more directly counter to the Roosevelt theories, particularly to planned economy. Hence this change would be fought with all the strength of the New Deal, and, while the outcome may be doubtful, certainly no business man would be prudent to count on this amendment.
Carter Field, McGraw-Hill Washington Bureau.

Social Security and Railroad Retirement programs that cost nearly $300,000,000 more than the income from taxes imposed to finance them. While the Treasury statement emphasized that such a condition was not to be considered permanent, the public now realizes that many of the outlays made under the plea of emergency are difficult to shake off.

The Administration failed to block approval in the House of a series of amendments to the Treasury Post Office appropriation bill providing pay raises and additional funds for the postal service aggregating $2,300,000. On the heels of a revelation that a $2300-a-year vouch clerk in the National Parks service had defrauded the government of $84,800 over a three-year period, a report made by two of Secretary Harold L. Ickes investigators pointed out to the Senate Committee on Public Lands, that a lophole in the control of millions of dollars of conservation work funds has existed within the Department of the Interior.

The Navy appropriations bill for the fiscal year 1939, as reported to the House, carried $553,000,000, including funds to begin construction of 22 ships and to continue work on the 74 navy vessels now building. Even this may look like small change before Congress finishes. The Senate always goes in heavier for armament than the house. It is considered merely a question of time before the 35,000-ton limit on battleships provided in the London treaty is abandoned. An understanding between the United States, Great Britain and France, which would include scrapping of treaty restrictions on naval ships of all categories, is regarded as the logical conclusion of the rapidly developing naval race already well under way. Japan is said actually to have under construction three new battleships which are variously reported as being 43,000 to 46,000 tons and armed with guns of 18-in. caliber. In addition, the War Department budget submitted to Congress by the President totals $421,000,000 which is an increase of nearly $12,000,000 over the preceding year.

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Jap Army Guarantees Orders For Two Years

TOKYO—Japanese machinery makers, especially those conducting business on a small and medium scale, have been assured by the defense authorities that they will get munitions orders at least for two years after the termination of the current hostilities. This assurance is considered to give much encouragement to those makers who have hesitated to take up manufacture of ordnance machinery for fear of a reactionary depression after the war.

More than one-half of the applications for machine-tool imports, amounting to 60,000,000 yen at the end of 1937, are likely to be rejected by the finance authorities on the ground that they are of a "speculative nature." The threat of an American export embargo, the actual suspension of imports from England, Germany and Italy, and a rising price trend are mentioned as the principal speculative factors.

All machinery importers are vigorously opposed to the attitude of the Finance Ministry, particularly its reported plan to lower the exchange control exemption limit from 1,000 yen to 100 or 200 yen. The import merchants contend that as the estimated capacity of Japanese machine tool manufacturers was around 30,000,000 yen for 1937 against some 70,000,000 yen for estimated imports, it is unwise to give too much encouragement to a domestic production increase merely for the sake of suppressing imports. They assert that such encouragement would certainly bring about overproduction in the near future. In order to maintain only a limited number of major factories, the government would then be forced to spend a tremendous sum as subsidies. Since the demand today is abnormal the treasury authorities might well reconsider its withholding of 10,000,000 or 20,000,000 yen worth of imports applications now pending.

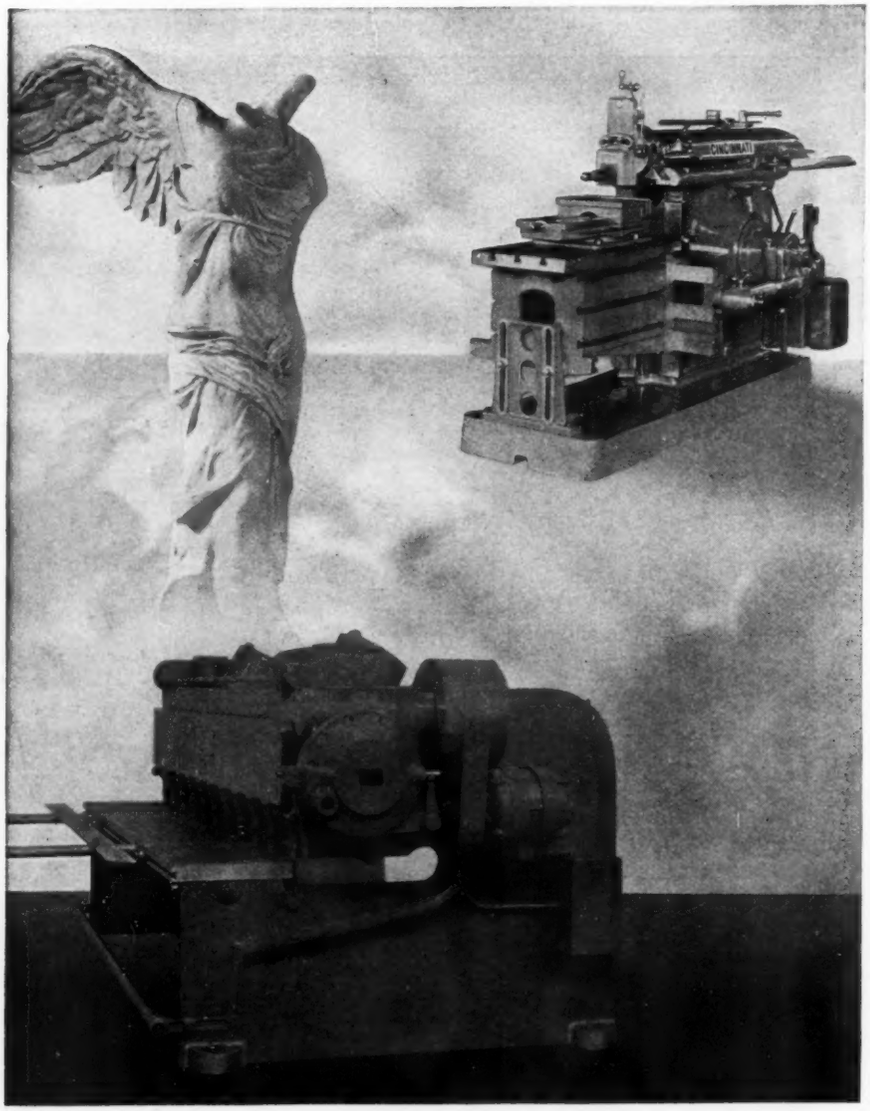
Though not supplied to first-rate factories where inspection is known to be strict, quite a number of machine-tool buyers have discovered that they have been sold cheap Japanese-made stuff bearing the trade marks of reputable American and European machine builders. In some cases the outward appearance had been skilfully adapted to the design of the foreign makes, the *Nippon Kogyo Shimbun,* industrial news organ of Osaka, reports. The paper ascribes this racket to the difficulty in obtaining imported machinery due to the strict import exchange control.

Expansion in Manchukuo

As part of the projected Manchukuo Heavy Industry Co. under the leadership of G. Aikawa's Nissan concern the Hitachi Works, Ltd., a Nissan affiliate, has decided to set up a 5,000,000-yen branch enterprise in Mukden. Half this amount will be paid up at the outset. The new firm will be principally engaged in foundry work.

Mr. Aikawa is planning a visit to the United States. It is understood that he will be seeking not only technical but also material assistance from American industry.

Two other firms which were formerly controlled by the South Manchuria Railway Company but which have now come under Nissan management are planning to gear up production to cope with the rising machinery demand in the railway



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zone. These are the Dairen Dock & Iron Works, Ltd., which has doubled its capital to 4,000,000 yen, and the Dairen Machinery Works, Ltd.

The total amount of new capital invested in Japan's machinery industry during the first eight months of 1937 amounted to 340,329,000 yen, approximately $101,000,000, according to an investigation by the Bank of Japan. Though a detailed classification is not available, the larger portion of the new capital was invested in aircraft, precision machinery and machine tool concerns.

Credits to Japanese Considered Unlikely

WASHINGTON—Efforts of Japanese industrial interests to obtain credits for purchase of machinery here are not favored, according to sources close to the government.

General Motors Has $6,000 Invested Per Employee

An investment of more than $6,000 in factories, tools, equipment and materials for each of its employees was disclosed by the General Motors Corp. in a statement showing that customers, products, management, and capital are the necessary factors that go to make up a job. It was explained in the booklet "What is a Job?" that among the 205,000 General Motors employees there are about five men employed in factory production for each worker in research, engineering, purchasing, selling, advertising and keeping records. It is said that the corporation provides income for a million families.

Ralph Flanders Elected A.E.C. Vice-President

WASHINGTON—Nearly 100 leading engineers and educators gathered in Washington Jan. 13-15 to attend the eighteenth annual assembly of the American Engineering Council, the function of which is to formulate and express the united opinion of all branches of the profession on matters relating to public policy. Among the many questions up for discussion the more important were the following:

Technologic Research—Pointing out that engineering and scientific research is an investment in public welfare, since it promotes a higher standard of living and increased employment, a committee headed by R. S. McBride recommended that the federal government encourage such activity in its own departments, in educational institutions, and in private industry. As a means of doing this, the committee suggested one tentative plan—the formation of a Federal Research Commission, the members of which would be the heads of federal agencies engaged in research activities. Such a body could serve governmental and private research activities by acting as a project clearing house to prevent duplication of effort, and might also be used to allot federal financial aid to meritorious non-commercial projects proposed by educational institutions and endowed laboratories.

Conservation—Although no formal action was taken, a discussion of the present tendency toward large-scale planning of conservation measures and the development of natural re-

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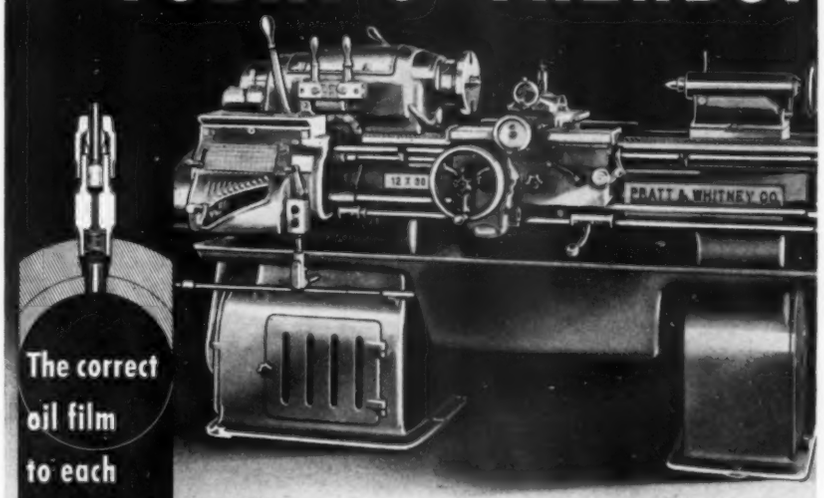

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sources leaned strongly toward the opinion that such planning is desirable, but should take the form of a co-ordination of locally-originated proposals rather than an assumption of leadership by a central agency.

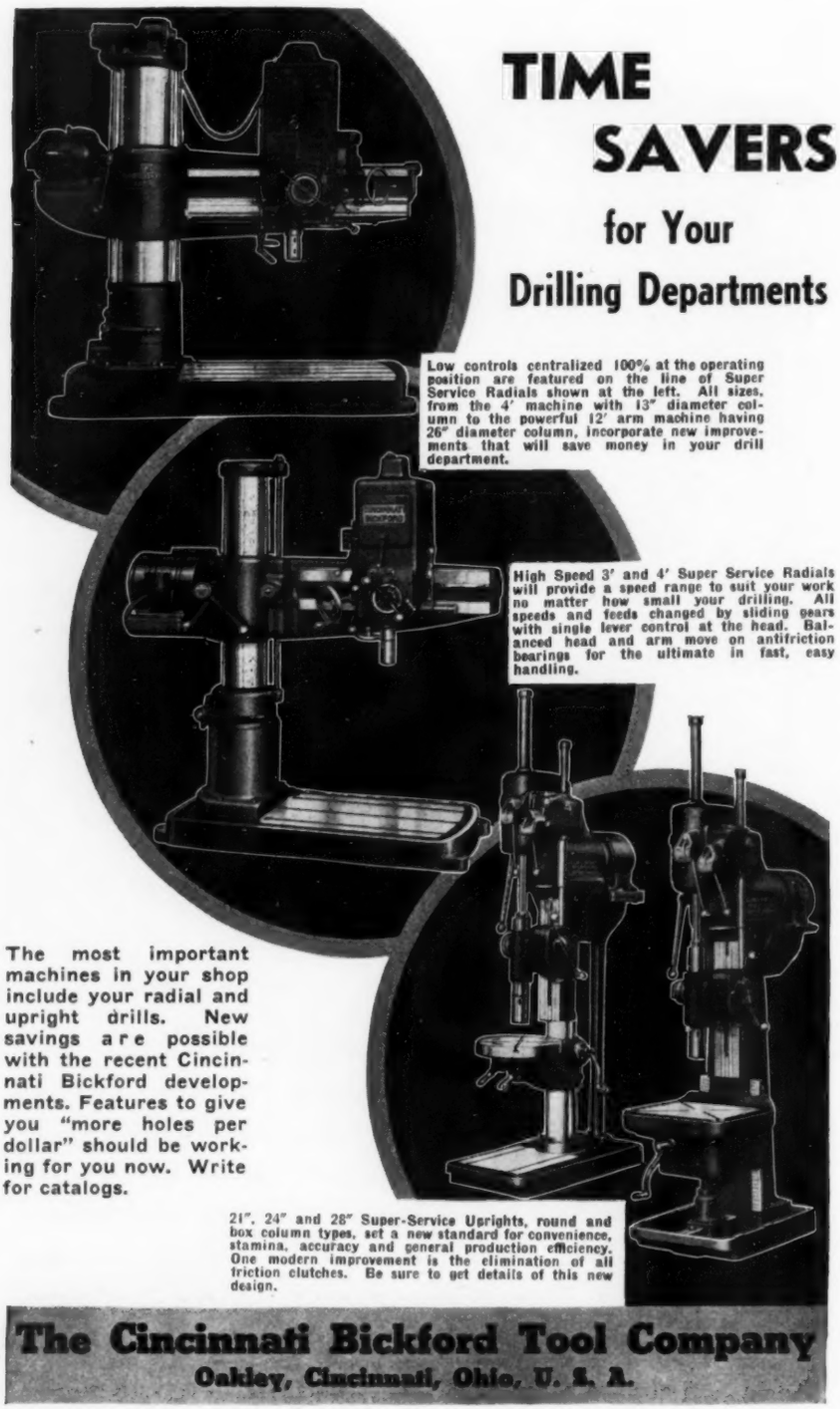
Compensation—Studies of the economic status of the engineer which have been fostered by the Council were reviewed, and will be continued.

Merit System—Again, the discussion was in the nature of a progress report on factual studies now being carried on, which will be continued.

Public Works—The long-time stand of the Council in favor of a single department of public works within the national government is gradually shifting, in recognition of the political difficulties involved, toward a more general position favoring greater co-ordination among federal construction agencies.

Finance—In recognition of the fact that many of Council's activities are hampered by lack of funds, the meeting discussed the advisability of seeking grants from non-commercial sources, such as the various foundations, to be used in carrying out specific projects. It was pointed out that every precaution must be taken to avoid any action that might interfere with, or appear to influence, Council's freedom of action or embarrass the member societies. This matter will be studied further.

Officers elected at the meeting were: president, Dr. William McClellan, representing the A.I.E.E.; vice presidents, Ralph E. Flanders (A.S.M.E.) and A. J. Hammond (Am. Soc. C. E.); treasurer, Leonard J. Fletcher (Am. Soc. Agricultural Engineers).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Lipe Buys Porter-Cable Lathe Division

Purchase of the lathe division of the Porter-Cable Machine Co., Syracuse, N. Y., by W. C. Lipe, Inc., also of Syracuse, was announced January 5 by H. Follette Hodgkins, head of the Lipe interests. The new ownership is continuing the production of the entire Porter-Cable line without specification changes and without any break in manufacturing schedule. Porter-Cable will not concentrate all production facilities on its line of portable tools for woodworking, according to W. A. Ridings, president.

Gear tooth chamfering machines, index milling, drilling and burring equipment have been manufactured by W. C. Lipe, Inc., for many years, and this line is in no way affected by acquiring the Porter-Cable lathe business. Engineering and manufacturing of special machine tools by Lipe will be carried on without change.

Full floor space and facilities of the present Lipe plant in Geddes St., Syracuse, are being devoted to manufacture of lathes and other machine tools. This arrangement is made possible by the lease of additional quarters in Wyoming St. for the expanding production of heavy-duty automotive clutches made by Lipe.

Personnel now identified with the Porter-Cable lathe business under the Lipe name include Mr. Hodgins as president and general manager; J. D. Williams, assistant general manager, E. R. Fish, chief engineer, and Robert J. Russell, sales manager of the lathe division. Mr. Russell was recently the sales engineer of Porter-Cable Machine Co. and previously master mechanic of the H. H. Franklin Mfg. Co.

BUSINESS ITEMS

Cutler-Hammer, Inc., Milwaukee, manufacturers of electric control apparatus, has announced that a company known as Canadian Cutler-Hammer Ltd. has been organized for manufacturing Cutler-Hammer motor and generator control products for the Canadian market. The company will be a subsidiary of the Amalgamated Electric Corp., Ltd., which will provide manufacturing facilities. Headquarters will be at 384 Pape Ave., Toronto 6, Canada. Production was scheduled to start in January. The Northern Electric Co. of Canada, for many years the principal distributor for Cutler-Hammer in Canada, will act as the distributor for the new Canadian company.

MEL KORDENBROCK, formerly with Lodge & Shipley Machine Tool Co., and the Sterling-French Machinery Co., has announced opening of the Kordenbrock Machinery Co. at 2842 E. Grand Blvd., Detroit, to represent the Reed-Prentice Corp., Partool Machine Co., Detroit Universal Duplicator Co., A. P. DeSanno & Son, and others.

The Diehl Manufacturing Co., Elizabethport, N. J., celebrated its 50th anniversary, January 6-11, during a sales conference. The conference was called by FRANK B. WILLIAMS, JR., vice-president and sales manager.

Worthington Pump & Machinery Corp., Harrison, N. J. has announced acquisition of an interest in the Moore Steam Turbine Corp., Wellsville, N. Y.

L. L. Richards Machinery Co., Milwaukee, Wis., has been incorporated as a machine tool dealer. The organization includes L. L. RICHARDS, formerly general manager of Badger-Packard Machine Co., Milwaukee; C. R. DANIELS, formerly in the sales department of Jos. T. Ryerson Sons Co.

The High Speed Hammer Co., Inc., Rochester, N. Y., has appointed The Canadian Fairbanks-Morse Co. Ltd., as exclusive representatives for the Province of Quebec in addition to Ontario for both riveting hammers and precision drilling machines.

Executive and general sales offices of M. H. Rhodes, Inc., manufacturer of timing devices, have been moved from Rockefeller Center, New York, to the factory at 30 Bartholomew Ave., Hartford, Conn.

Spencer Lens Co., 19 Doat St., Buffalo, has completed negotiations for the purchase of 25 acres at Eggert & Sugar Roads, Cheektowaga, a Buffalo suburb. BURTON H. WITHERSPOON, vice-president and general manager outlined construction soon of a production unit to be followed by others as increased business warrants. The concern manufactures microscopes, microtomes, still projection apparatus and scientific optical instruments.

Thornton Co., New York, has acquired manufacturing facilities in Westbrook, Conn., and is now transferring machinery there to be used for manufacturing needles.

The James Clark, Jr. Electric Co., Louisville, has appointed H. K. McJUNKIN as Pittsburgh representative with headquarters at 7800 Edgewood Ave., Swissvale, Pa.

PERSONALS

A. L. BERGSTROM has been appointed executive engineer of the Timken Roller Bearing Co., following the resignation of ERNEST WOOLER, who was chief engineer. Mr. Bergstrom was formerly chief works engineer. Other appointments are: R. M. RIBLET, chief engineer of automotive division; J. B. BAKER, assistant chief engineer of the automotive division and chief engineer of the rock bit division; S. M. WECKSTEIN, chief engineer of the industrial division; H. C. EDWARDS, chief engineer of fuel injection equipment divison; W. C. MAKLEY, chief works engineer.

DELMAR G. ROOS, former president of the Society of Automotive Engineers, and recently connected with Humber, Ltd., Coventry, England, as consulting engineer, has been made vice-president and chief engineer of the Willys-Overland Motors, Inc. The announcement was made by WARD M. CANADAY, chairman of the board. Mr. Roos has been

PRECISION PAYS

It's a matter of sound good judgment to specify Danly Precision Die Sets for your dies. Guide posts are hardened, ground and *lapped* to ± 1/10,000 of an inch. You get maximum protection from production line tie-ups due to shearing, and consequent need for repair and regrinding of the die, if not destruction of the die itself.

DANLY DIE SETS AND DIE MAKERS' SUPPLIES
From the 8 Danly Branch Office Stocks

BRANCHES:
LONG ISLAND CITY, N. Y. 36-12 34th STREET
DETROIT, MICHIGAN 1549 TEMPLE AVENUE
CLEVELAND, OHIO 1745 ROCKWELL AVENUE
DAYTON, OHIO 990 E. MONUMENT AVENUE
PHILADELPHIA, PA. 3913 N. BROAD STREET
ROCHESTER, N. Y. 16 COMMERCIAL STREET
MILWAUKEE, WIS. 513 EAST BUFFALO STREET

PRECISION PAYS—DIE SETS ARE PRECISION TOOLS

Get production line insurance by specifying Danly Die Sets.

DANLY MACHINE SPECIALTIES, Inc., 2110 So. 52nd Ave., Chicago, Ill.

DANLY PRECISION DIE SETS

chief engineer of Marmon, Pierce-Arrow, and Studebaker.

CLARENCE E. JACOBSEN has been elected vice-president of the Chicago-Latrobe Twist Drill Works, and will be in charge of the eastern territory with headquarters in the Public Ledger Bldg., Philadelphia.

STUART M. CROCKER, vice-president of the International General Electric Co. since 1930, has been appointed assistant to CHARLES E. WILSON, new executive vice president of the General Electric Co.

E. L. ZEHRBACH has been elected president of the Bluffton Manufacturing Co., manufacturers of washing machines and automatic stokers, Findlay, Ohio. He succeeds ALBERT C. LORA who has retired after seventeen years as head of the firm. The new president is a son of the late H. D. ZEHRBACH who founded the company 50 years ago.

KARL A. PAULEY, since 1922 engineer of the Industrial Department, General Electric Co., has retired after 39 years service with the concern. He will continue to act, however, in a consulting capacity. Mr. Pauley entered the test course in May, 1899.

MORRIS ZACK has been elected president, M. W. Zack Metal Co., Detroit. LOUIS W. ZACK is vice-president and treasurer.

ABBOTT F. RIEHLE has been made sales manager of the Smootharc welder and welding electrode division, Harnischfeger Corp., Detroit. Mr. Riehle was formerly with the Riehle Bros. Testing Machine Co., in charge of sales and management until the company was taken over by the American Machine & Metals, Inc., where he continued in charge of sales.

PIERRE MICHELIN, son of Edouard Michelin, a founder of the Michelin Tire Co., was killed in an automobile accident near Paris. Mr. Michelin was president of the Citroen Automobile Co.

P. W. AULAR has resigned as designing engineer of the Titusville Iron Works Co., Titusville, Pa., to accept a similar position with the United Supply & Mfg. Co., Tulsa, Okla.

"IT CAN'T BE DONE"
But They Did It
WITH A
DUMORE

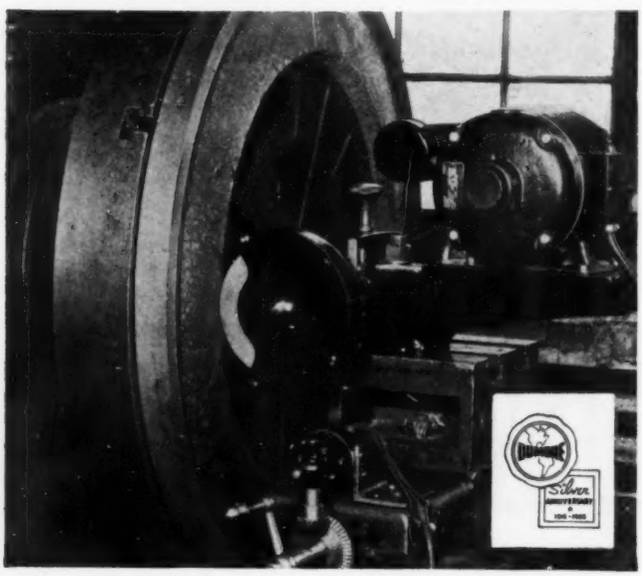
Trying to grind this 40-inch ring of *chilled* cast iron, three ordinary grinders had "cracked up." Stumped, the tool room foreman called in a grinding specialist, who suggested a Dumore No. 12 "Chief" set up as shown. In jig time the job was done!

Licking tough jobs is a habit with Dumore lathe grinders. But that's only half the story. When you see how they cut costs, pep production and improve the quality of the finished product, you'll understand why so many shops are using more and more Dumores.

There are plenty of places in your shop where it will pay to put Dumore high speed and precision to work.

Write for facts today.

THE DUMORE CO., Dept. 138-A, Racine, Wis.



THESE DISTRIBUTORS STOCK DUMORE TOOLS

AKRON—Hdwe. & Supply Co.
ATLANTA—Fulton Supply Co.
BALTIMORE—L. A. Benson
BIRMINGHAM—Young & Vann Supply Co.
Moore-Handley Hdwe. Co.
BOSTON—Chandler & Farquhar
Chase, Parker & Co., Inc.
(Cambridge) Carter, Wood & Sanderson Co.
BRIDGEPORT, CONN.—Hunter & Havens
BUFFALO—Beals, McCarthy & Rogers, Inc.
CANTON—Canton Hdwe. Co.
CHARLESTON, S. C.—Cameron & Barkley Company
CHATTANOOGA—Chattanooga Belting & Supply Co.
CHICAGO—C. H. Besly & Co.
R. E. Ellis Eng. Co.
E. L. Exley Machy. Co.
Samuel Harris & Co.
CINCINNATI—E. A. Kinsey Co.
CLEVELAND—Cleveland Tool & Supply Co.
W. M. Pattison Supply Co.
Strong, Carlisle & Hammond
COLUMBUS—Osborne & Saxton
DALLAS—Briggs-Weaver Machy.
DAYTON—C. H. Gosiger Machy.
W. H. Kiefaber Co.
DENVER—Hendrie & Bolthoff Mfg. & Supply Co.
DETROIT—Boyer-Campbell Co.
Chas. A. Strelinger Co.
ERIE, PA.—H. P. Weller Sup. Co.
FT. WAYNE—Nat'l. Mill Sup. Co.
GRAND RAPIDS—Mfrs. Sup. Co.
HARTFORD—Hunter & Havens
Silliter-Holden, Inc.
HOLYOKE—J. Russel & Co.
HOUSTON—Wessendorff, Nelms & Co.
O. H. Van Horn Co., Inc.
INDIANAPOLIS—Kleiber-Dawson Sales Co., Inc.
Vonnegut Hardware Co.
JACKSON, MICH.—Smith-Winchester Co.
JERSEY CITY—Manning, Maxwell & Moore Co.
KANSAS CITY, MO.—Ellefdt Hdwe. & Machy. Supply Co.
English Bros. Machy. Co.
KNOXVILLE—W. S. Morrian Co.
LANCASTER, PA.—Reilly Bros. & Raub
LOUISVILLE—Neill-LaVielle Supply Co.
LOWELL, MASS.—Nobes Machy. & Supply Co.
LOS ANGELES—Ducommun Metals & Supply Co.
Eccles & Davies Machy. Co.
Machinist Tool & Supply Co.
M. N. Thackaberry
MILWAUKEE—W. A. Voell Machy. Co.
Western Iron Stores Co.
MINNEAPOLIS—Duncan & Co.
MOLINE, ILL.—J. J. Normoyle Co.
MONTREAL—Canadian Fairbanks-Morse, Ltd.
Williams & Wilson, Ltd.
MUSKEGON, MICH.—Muskegon Hdwe. Co.
NASHVILLE—Buford Bros., Inc.
NEWARK—Abrasive Machine & Supply Co.
NEW HAVEN—C. S. Mersick
Page, Steele & Flagg
NEW ORLEANS—Oliver H. VanHorn Co., Inc.
NEW YORK—Morris Abrams Guarantee Specialty Co.
Hansen & Yorke Co., Inc.
ORLANDO, FLA.—Harry P. Lee, Inc.
PEORIA—Couch & Heyle, Inc.
PHILADELPHIA—Maddock & Co.
W. B. Rapp, Machinery
PITTSBURGH—Standard Machinist's Supply Co.
PORTLAND, ORE.—J. E. Haseltine & Co.
PROVIDENCE—Belcher & Loomis Hardware Co.
Brownell Machinery Co.
Reynolds Machinery
READING, PA.—Reading Machine & Tool Co.
RICHMOND—Smith-Courtney
ROCHESTER, N. Y.—Erskine-Healy
ROCKFORD, ILL.—Mid-States Industrial Corp.
SAGINAW, MICH.—Reichle Supply Co.
ST. LOUIS—Colcord Wright Machinery & Supply Co.
SALT LAKE CITY—Salt Lake Hardware Co.
SAN FRANCISCO—Harron, Rickard & McCone Co.
C. W. Marwedel
SEATTLE—Cragin & Co.
Seattle Hardware Co.
SHREVEPORT—Van Horn & Co.
SOUTH BEND—So. Bend Sup. Co.
SPRINGFIELD, MASS.—Carlisle Hardware Co.
SYRACUSE—Syracuse Supply Co.
TAMPA—Cameron & Barkley Co.
TOLEDO—Cornell Supply Co.
Kirby Mach. & Supply Co.
National Supply Co.
TORONTO—Canadian Fairbanks-Morse
TROY, N. Y.—Fred K. Blanchard
TULSA—Mach. Tool & Sup. Co.
VANCOUVER, B. C.—Crossman Machinery Co., Ltd.
WORCESTER, MASS.—Waite Hdwe. Co.
YORK, PA.—York Machy. & Supply Co.

OBITUARIES

JAMES G. BROWN, long resident in Japan, and engaged in distribution of machine tools in that country, died October 25 in Tokyo. In 1900 Mr. Brown went to Europe as a representative of the Automatic Machine Co., and represented American interests in Germany, Italy, Belgium, Austria, Russia and Scandinavian countries. He was appointed Far Eastern representative in 1905 and decided to reside in Japan in 1913.

CLARENCE E. BRINKMAN, 40, superintendent of the Hanson Clutch & Machinery Co., Tiffin, Ohio, died Jan. 7 following a short illness of pneumonia.

E. R. SHAW, charter member of the A.B.P. and of the A.B.C. and publisher of *Power Plant Engineering* died at Tuscon, Ariz., Jan. 13.

GEORGE H. HARRIS, 57, asst. superintendent, American-LaFrance Foamite Co., Elmira, N.Y., died Jan. 19.

MEETINGS

AMERICAN MANAGEMENT ASSOCIATION. Personnel division, Feb. 15-17. Palmer House, Chicago. Eighth packaging exposition, March 22-25, Palmer House, Chicago.

AUTOMOTIVE ACCESSORY MFRS. ASSOC. Eleventh annual exposition, Feb. 28-Mar. 1. Port Authority Bldg., New York.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION. Annual meeting, Feb. 8. Cleveland Hotel, Cleveland, Ohio. ARTHUR J. TUSCANY, executive secretary and treasurer, Penton, Bldg., Cleveland, Ohio.

INTERNATIONAL AIR SHOW. Exhibit of equipment and supplies, Jan. 28-Feb. 6. International Amphitheatre, Chicago.

INTERNATIONAL HEATING & VENTILATING EXPOSITION. Jan. 24-28. Grand Central Palace, New York.

NATIONAL RAILWAY APPLIANCES ASSOCIATION. March 14-17. Chicago.

TRADE PUBLICATIONS

APPRENTICE GRADUATES An 8-page bulletin offered by Brown & Sharpe Mfg. Co., Providence, R. I., lists 269 apprentice graduates who were connected with the organization during 1937. Group photographs show those graduates who were in Providence during September, 1937.

CALITE CHAIN Calorizing Co., 410 Hill Ave., Wilkinsburg Station, Pittsburgh, Pa., is distributing Circular No. RC, which discusses the use of "Calite" rivetless chains for furnace conveyors.

CARBURIZING Carburizing boxes and trays of "Calite" alloy are described in a 4-page bulletin offered by The Calorizing Co., 410 Hill Ave., Wilkinsburg Station, Pittsburgh, Pa.

CATERPILLAR PRODUCTS A mailing folder, Form No. 4496, offered by Caterpillar Tractor Co., Peoria, Ill., includes photographs of a wide variety of jobs being done by "Caterpillar" products.

CLEANING A mailing folder being distributed by Pangborn Corp., Hagerstown, Md., describes the "Airless Rotoblast" cleaning cabinet.

COMPRESSORS Pennsylvania Pump and Compressor Co., Easton, Pa., has announced publication of Bulletin No. 180, which discusses the design and construction of PPC duplex air and gas compressors.

DIAMOND TOOLS A pamphlet discussing the use of diamond tools for industrial purposes has been announced by Maurice S. Dessau & Co., 6 Maiden Lane, New York, N. Y. Suggestions regarding the proper use of diamond tools are included, as are photographs of various types of such tools.

ELECTRIC FANS A 24-page catalog offered by The Emerson Electric Mfg. Co., St. Louis, Mo., discusses the features of the 1938 line of Emerson-Electric fans.

ELECTRODES Heavy-coated "Murex" welding electrodes for various applications are discussed in a 30-page booklet offered by Metal & Thermit Corp., 120 Broadway, New York, N. Y.

ENGINEERING BULLETIN Engineering Bulletin, Research Series No. 57, published by Purdue University, Lafayette, Ind., is a report of the Research and Extension Activities of the Engineering Schools and Departments for the Sessions of 1936-1937.

ENAMELING Design and selection of alloys for enameling furnaces is discussed in Circular EN, offered by The Calorizing Co., 410 Hill Ave., Wilkinsburg Station, Pittsburgh, Pa.

EYE HAZARDS "Eye Hazards in Industrial Occupations", a 247-page book dealing with the safeguarding of eyesight in factories, mines, shops and offices and including 59 illustrations, is offered at a special price of 50 cents per copy by The National Society for the Prevention of Blindness, Inc., 50 West 50th St., New York, N. Y.

GRINDING WHEELS Form ESA-55, offered by Abrasive Co., Division of Simonds Saw & Steel Co., Tacony & Fraley Sts., Philadelphia, Pa., discusses the use of Type K-Bond Borolon vitrified wheels for production work on centerless grinders.

NO QUESTION about Oilgear Surface Broaching Machine PERFORMANCE
•One or more pieces finish-broached simultaneously
•Highest production at close tolerances
•Each unit complete and self-contained
•Single lever, semi-automatic control
•Automatic full interlock of broach and shuttle tables
•Welded all-steel construction
•6, 10, 16, 20 ton capacities
The Oilgear Variable Delivery Pump has enough long and exacting service behind it to demonstrate beyond question its greater smoothness of operation, its greater dependability of performance, what it means in reduced maintenance costs. And just as you would expect, this famed pump, applied to Oilgear Surface Broaching Machines, is setting new high marks in production at the closest tolerances desired. For what Oilgear means in terms of *your* problems, write for full information including Bulletin 23,000A. THE OILGEAR COMPANY, 1301 W. Bruce St., Milwaukee, Wis.
OILGEAR SURFACE BROACHING MACHINES

GRINDING WHEELS Catalog No. 10, a 45-page booklet published by American Emery Wheel Works, Providence, R. I., and entitled "Grinding Wheel Guide," discusses the various abrasives used in making grinding wheels, features a new method of wheel marking, and tabulates grain and grade recommendations for various grinding operations.

HEAT TREATMENT Leeds & Northrup Co., Philadelphia, Pa., announce publication of a 36-page catalog, No. T-621, describing the "Vapocarb Hump" triple-control method for the heat-treatment of steel. Advantages of this method are discussed in detail.

INDEXING CHUCK The Hartford Special Machinery Co., Hartford, Conn., is offering a four-page bulletin describing the "Super-Spacer" indexing chuck which uses masking plates to obtain from 2 to 24 accurate spacings.

MALLEABLE IRON Belle City Malleable Iron Co., Racine, Wis., has announced publication of a folder discussing the properties of Pearlitic malleable irons and giving information on the qualities and physical properties of "Belmalloy."

MARKET RESEARCH The Marketing Research Division, Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., offers a 53-page "Check Sheet—Introduction of New Industrial Products, Revised 1937" which is primarily intended to offer to manufacturers of industrial merchandise a checking list that will help them avoid the heavy expense caused by failure to cover every problem involved in the marketing of a new product.

METAL SPRAYING Metallizing Engineering Co., Inc., 44 Whitehall St., New York, N. Y., has announced publication of a 16-page booklet in which is reprinted a paper, "Metal Sprayed Surfaces in Relation to Lubrication," prepared by Harry Shaw and read before an engineering association meeting in Manchester, England, on Oct. 20, 1937. Charts and photographs are used to illustrate this discussion.

METAL SPRAYING The Model OZ-3 metal spray gun, offered by Stevens Metal Spraying, Inc., 81 Shipley St., San Francisco, Calif., is described in an 8-page bulletin now being mailed.

NIAGARA MACHINES Booklet No. 106, announced by Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y., gives a presentation of the complete line of presses, shears and machines for shearing, blanking, drawing and forming sheet and plate metal.

PERSONNEL "Functions of the Personnel Director" is the title of a report recently issued by the Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York, N. Y. This report is based on information obtained from 80 companies in varied industrial and commercial fields.

POTENTIOMETER A folder entitled "Legibility Plus Precision" describing the features of a multiple potentiometer recorder which provides a legible record in both multi-color and numerals, is offered by The Brown Instrument Co., Wayne & Roberts Ave., Philadelphia, Pa. This folder No. 84-9, is printed in seven colors to reproduce the numeral records as they are printed on the charts by this instrument.

POWER TRANSMISSION Catalog No. 52-1938, announced by Boston

You can always depend on Wyckoff for any cold drawn steel specification. Whether you require standard SAE ratings or whether your job demands a steel of unusual metallurgical characteristics or exceptional accuracy as to size and shape, remember Wyckoff can serve you superlatively well through a nationwide network of Distributors carrying complete Warehouse stocks—a service as near as your telephone.

WYCKOFF DRAWN STEEL COMPANY
General Offices: FIRST NATIONAL BANK BUILDING, PITTSBURGH, PA.
Mills at AMBRIDGE, PA. and CHICAGO, ILL.
Manufacturers of...Carbon and Alloy Steels...Turned and Polished Shafting ...Turned and Ground Shafting...Wide Flats up to 12" x 2". Warehouse stocks carried by nationally known distributors

Gear Works, Inc., Hancock & Hayward Sts., North Quincy, Mass., lists standard gears, chain drives, geared motors, speed reducers, couplings and other power transmission equipment. This 320-page catalog is indexed for ready reference.

PUBLIC AFFAIRS "Colonies, Trade and Prosperity," a 32-page pamphlet announced by the Public Affairs Committee, Inc., 8 West 40th St., New York, N. Y., was prepared by Maxwell S. Stewart on the basis of memoranda published by a joint committee of the Carnegie Endowment for International Peace and the International Chamber of Commerce.

"PURAIR" HELMET Bulletins No. S-81 and S-88, announced by The W. W. Sly Mfg. Co., Cleveland, Ohio, describe the "Purair" helmet, which is designed to safeguard the wearer against inhalation of injurious dust regardless of fineness or concentration. A compressor designed to furnish air to this helmet also is described.

PYROMETERS Catalog No. 1101-D offered by C. J. Tagliabue Mfg. Co., Park and Nostrand Aves., Brooklyn, N. Y., discusses "Celectray" high-speed photo-electric action pyrometers. Accessories also are described.

ROLLER BEARINGS Catalog No. 14, a 74-page booklet announced by Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill., discusses the features of Shafer Roller-Bearing Units of various types. A separate price list is available for use with this catalog.

ROLL GRINDERS Catalog No. V-37, an 18-page bulletin announced by Landis Tool Co., Waynesboro, Pa., discusses the features of Type 30 roll grinders, which are available in sizes suitable for rolls up to 60-in. in diameter.

ROTARY FILES Mill-cut rotary files are listed and described on a catalog sheet announced by The Hamilton Tool Co., 220-48 No. B St., Hamilton, Ohio.

RUBBER HOSE Manhattan Rubber Mfg. Div., Raybestos-Manhattan, ing high-speed shearing of irregular illustrated folder showing installations of rubber hose in different industries.

SAVINGS Machinery and Allied Products Institute, 221 North La Salle St., Chicago, Ill., announces publication of a 36-page pamphlet entitled "Savings and American Progress". This is a sequel to "Capital Goods and American Progress" and constitutes a further discussion of the relation of wealth-creating enterprise to employment and the American standard of living.

SHEARS Libert Machine Co., Inc., Green Bay, Wis., announces publication of an illustrated folder describing high- speed shearing of irregular shapes with the "Hi-Speed" shear.

SEPARATOR MAGNETS Bulletin No. 910 offered by The Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio, is an 8-page booklet describing various applications of separator magnets and listing dimensions of standard units.

SHOWS AND EXHIBITS Exhibitors Advisory Council, Inc., 330 W. 42nd St., New York, N. Y., has announced publication of "Shows and Exhibits To Be Held In 1938", a 22-page bulletin listing the various shows and exhibitions to be held during 1938 in the United States and various foreign countries.

16" x 8' South Bend Quick Change Gear Underneath Belt Motor Driven Precision Lathe on a manufacturing operation.

THE new 16-inch South Bend Series "T" Lathe, with its double wall apron construction, heat treated headstock spindle, and powerful, quiet underneath belt motor drive is the most popular modern lathe for the manufacturing plant, machine shop, and tool room. The lathe has precision for tool and gauge work, rigidity and power for duplicate manufacturing operations, and versatility for the many jobs in the machine shop. An all-around lathe at a price the smallest shop can afford.

68 Sizes and Types of Lathes for every purpose.

9" lathe prices start at $ 85
11" lathe prices start at $371
13" lathe prices start at $448
15" lathe prices start at $544
16" lathe prices start at $642

Write FOR BULLETIN

Bulletin No. 16-C illustrates, describes and prices the different models of the 16-inch lathe. Copy sent free, upon request.

SOUTH BEND LATHE WORKS
287 East Madison Street, South Bend, Indiana, U.S.A.

SOUTH BEND *Precision* LATHES
MODERN LATHES FOR MODERN INDUSTRY

SEARCHLIGHT SECTION

EMPLOYMENT : BUSINESS : OPPORTUNITIES : EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

10 cents a word, minimum charge $2.00.

Positions Wanted (full or part-time salaried employment only) ½ the above rates, payable in advance.

(See ¶ on Box Numbers)

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads. Replies forwarded without extra charge.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 Inch $6.25
2 to 3 inches..... 6.00 an inch
4 to 7 inches..... 5.75 an inch
8 to 14 inches..... 5.50 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page. *Contract rates on request.* A.M.

Copy for new advertisements must be received by Tuesday 10 a.m. to appear in the issue out Wednesday of the following week

POSITIONS VACANT

SUPERINTENDENT WANTED for a first class shop employing between one and two hundred men. P-341, American Machinist, 330 West 42nd Street, New York City.

EXECUTIVE WANTED who understands new and used machine tools for small important Middle West machinery company. Salary not less than $5000.00 per year. P-342, American Machinist, 520 No. Michigan Ave., Chicago, Ill.

ASSISTANT FACTORY MANAGER. Age 33-35. Graduate M.E. Familiar with mass production. Eventually will become factory manager. Fine opportunity. Position in Michigan. Give fully age, experience and former employers. P-343, American Machinist, 520 No. Michigan Ave., Chicago, Ill.

WANTED: Experienced foreman for gear cutting department. Must be familiar with all types of gear cutting for machine tool work including worms, spirals, bevel and spur gears. Give full information as to experience, age, nationality and compensation expected. Location New York State. P-344, American Machinist, 430 West 42nd Street, New York City.

WANTED: First class experienced inspector on machine tool work. Give full particulars as to experience, with whom and for how long, also age, nationality and wages expected. Apply Consolidated Machine Tool Corporation, Rochester, N. Y.

EMPLOYMENT SERVICE

SALARIED POSITIONS, $2,500 to $25,000. This thoroughly organized advertising service of 28 years' recognized standing and reputation carries on preliminary negotiations for positions of the caliber indicated through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreements. Identity is covered and, if employed, present position protected. If you have actually earned over $2,500, send only name and address for details. R. W. Bixby, Inc., 266 Delward Bldg., Buffalo, N. Y. (A.M.)

POSITIONS WANTED

Illinois

MACHINE DESIGNER—Chief draftsman, 18 years' experience, special automatic machines, machine tools, small interchangeable machines. Mueller, 4847 W. 24th Place, Chicago.

Massachusetts

PLANNING ENGINEER. Expert knowledge of planning machine tool operations—Routing, scheduling—twelve years actual shop experience, eight years supervising and planning work. PW-335, American Machinist, 330 West 42nd Street, New York City.

New York

PERSONNEL DIRECTOR—Seasoned executive: Mechanical engineer familiar all phases metal goods manufacturing; employment safety; vestibule training; welfare; hospitalization; insurance; wage incentives. PW-334, American Machinist, 330 West 42nd Street, New York City.

WANTED! TO PURCHASE A

SMALL TOOL MFG. BUSINESS

Give full particulars about Line, Equipment and Distribution. Address communications to

BO-339, American Machinist
330 W. 42nd St., New York City

WANTED

Production Man

To superintendents or assistant superintendents of first class plants making heavy machinery and who have proven themselves real producers we offer an unusual opportunity.

Must be A-1 mechanic between 35 and 40 and have thorough knowledge of machine shop operations, plate and sheet metal forming and welding. Foundry and pattern shop experience helpful but not essential.

Do not waste postage answering unless you fill above specifications. To receive consideration, give in first letter, your age, education, training, places employed, lengths of service and salary expected. All replies in absolute confidence.

P-326, American Machinist
330 West 42nd Street, New York City

CHIEF TOOL DESIGNER or executive in shop management who will cooperate, age 39 years, graduated mechanical engineer, with a record of 16 years' experience in the metal industry, in the design of tools and special labor saving machines, modern machine shop and pressroom methods, production problems and processing of work. Available 2 weeks after agreement. PW-338, American Machinist, 330 West 42nd Street, New York City.

MANUFACTURING EXECUTIVE, 25 years' experience, technical and practical, tool and machine design, chief draftsman, superintendent, development. Pratt graduate. Ingenious design of jigs, fixtures and all tools for the fabrication of small machines with interchangeable parts. Creative ability, patent knowledge. Available immediately, married, location immaterial. PW-340, American Machinist, 330 West 42nd Street, New York City.

TOOLMAKER AND DESIGNER available, 35 years' experience on tools, dies, automatic machines. Thorough technical education. Best references. Wishes position of responsibility with progressive manufacturer. PW-346, American Machinist, 330 West 42nd Street, New York City.

PATENT ATTORNEY

PATENTS—Booklet free. Highest references. Best results. Watson E. Coleman, Patent Lawyer, 724 Ninth Street, Washington, D. C.

OPPORTUNITY OFFERED

WANTED: Men in shops and drafting-rooms to sell technical books. Liberal commissions. Write and give name of firm you work for. Frank Dickman, 330 W. 42nd Street, New York City.

BUSINESS OPPORTUNITIES

WANTED: Someone with access to market who might be interested in manufacturing a new standard interchangeable punch and retainer, protected, to write, BO-345, American Machinist, 520 No. Michigan Ave., Chicago, Ill.

For

Contract Work Advertising

See page 321

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Used and Surplus Machine Tools and Shop Equipment

See page 305 to 321 inclusive

Pages 303-304 Missing

SEARCHLIGHT SECTION

AMERICAN MACHINIST

WHERE-TO-BUY

USED MACHINE TOOLS

AND SHOP EQUIPMENT

The numbers appearing under a classification identify advertisers so numbered in the Alphabetical Index.

The Norton-Broadway Machinery Co., page 319, and F. W. Burns Machinery Co., page 321, not indexed due to late receipt of copy

AIR COMPRESSORS—10, 26, 32, 41, 53

BENDERS AND STRAIGHTENERS—49

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CONFIDENCE.....

● The hazards that go with the purchase of used equipment are high. Confidence in one's source of supply is of primary importance. In such instances industrial concerns have turned to Motch & Merryweather for more than thirty years . . . and have found their confidence amply rewarded. They have come to agree with us that, if their investments are to pay out, only relatively late model machines are worthy of consideration and complete overhauling alone assures them of the results they must have in order to operate efficiently.

We invite *you* to inspect our stock of reconstructed quality machine tools. Note its size and its range; the number and variety of makes; the unusual types represented as well as the quantities of more common types. Adequate facilities, together with a broad knowledge of markets and manufacturing conditions, are implied.

Every Motch & Merryweather rebuilt machine is guaranteed to give satisfactory service. You are the judge. The guarantee is unconditional. Behind it is the integrity of a house which has served Industry well since 1904.

MOTCH AND MERRYWEATHER MACHINERY CO

CLEVELAND DETROIT
CINCINNATI PITTSBURGH

Shops & Warehouses • 888 East 70th Street
MAIN OFFICE • PENTON BLDG. • CLEVELAND, O.

HEADQUARTERS FOR REBUILT MACHINE TOOL VALUES

The Best "Buys" in Used Machine Tools:

STANDARD MAKES PLUS* REMANUFACTURING MONEY-BACK GUARANTEE

Only standard makes of fine tools brought on the market by liquidation, changes of method, etc., are purchased.

*THE "PLUS" VALUE:

Remanufacturing — was originated and developed by us to restore good tools to their original accuracy and serviceability.

REPRESENTATIVE USERS:

Include nationally known companies in practically every variety of machinery and metal product manufacturing—see our Green List.

TYPICAL TOOLS:
FROM STOCK

Selected from our 42 page catalog
.....**the GREEN LIST**

BORING MACHINES
5" bar N-B-P Floor Type
5" bar Newton Portable
No. 36 Rochester, 3½" bar
No. 3-A Universal, 3" bar

BORING MILLS
24", 36" Bullard "New Era"
42", 48", 54", & 60" Colburn
30", 52", & 62" King

DRILLS
1, 2, 3, 4, 6 spdl. Leland-Gifford
1, 2, 3, 4, 6 spdl. Henry & Wright
No. 2 Colburn, 1, 2, 3 & 4 spdl.
No. 14 Natco Multiple
No. 4 Baush Multiple
5' American Triple Purpose
5' American Full Univ. M.D.
6' American Triple Purpose

GEAR CUTTERS
No. 18-H Gould & Eberhardt
No. 16-HS Gould & Eberhardt
No. 6—60" Brown & Sharpe
No. 6—72" Brown & Sharpe

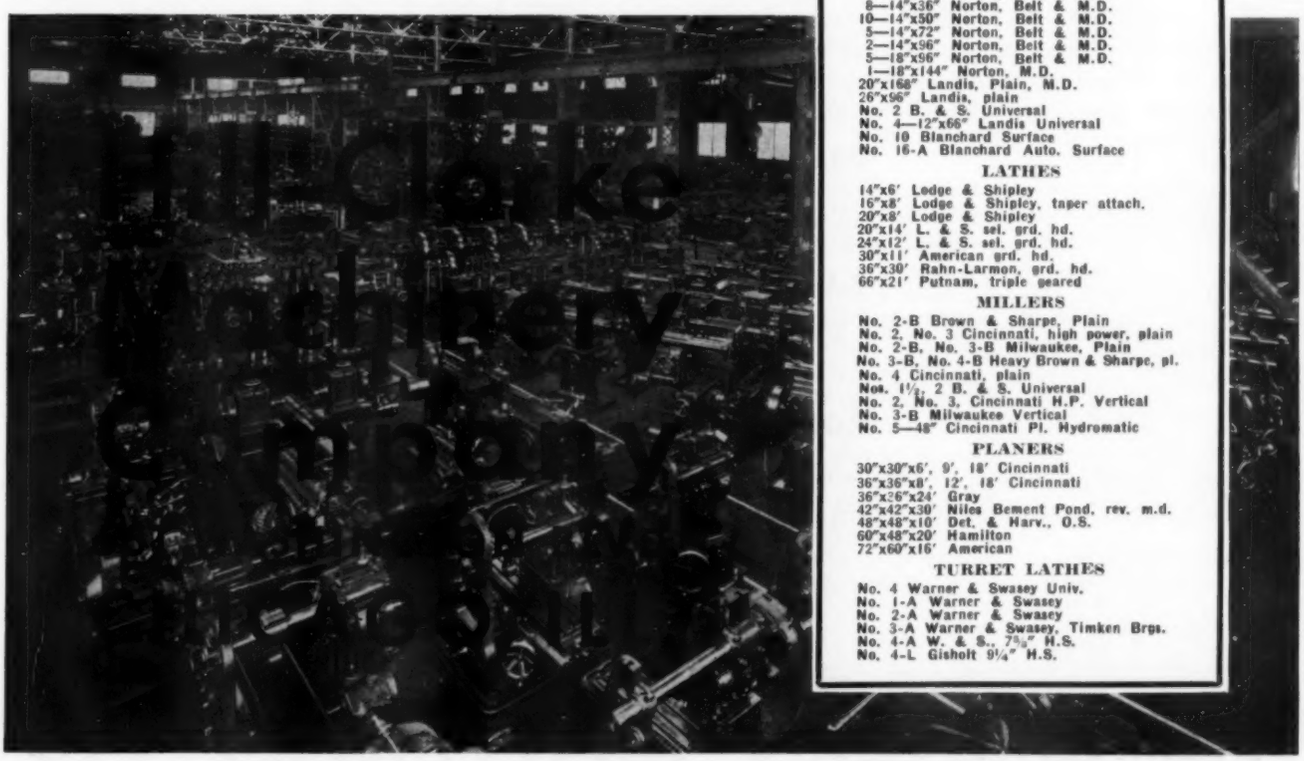
GRINDERS
8—6"x32" Norton, Belt & M.D.
5—10"x18" Norton, Belt & M.D.
12—10"x36" Norton, Belt & M.D.
8—10"x50" Norton, Belt & M.D.
3—10"x72" Norton, Belt & M.D.
8—14"x36" Norton, Belt & M.D.
10—14"x50" Norton, Belt & M.D.
5—14"x72" Norton, Belt & M.D.
2—14"x96" Norton, Belt & M.D.
5—18"x96" Norton, Belt & M.D.
1—18"x144" Norton, M.D.
20"x168" Landis, Plain, M.D.
26"x96" Landis, plain
No. 2 B. & S. Universal
No. 4—12"x66" Landis Universal
No. 10 Blanchard Surface
No. 16-A Blanchard Auto. Surface

LATHES
14"x6' Lodge & Shipley
16"x8' Lodge & Shipley, taper attach.
20"x8' Lodge & Shipley
20"x14' L. & S. sel. grd. hd.
24"x12' L. & S. sel. grd. hd.
30"x11' American grd. hd.
36"x30' Rahn-Larmon, grd. hd.
66"x21' Putnam, triple geared

MILLERS
No. 2-B Brown & Sharpe, Plain
No. 2, No. 3 Cincinnati, high power, plain
No. 2-B, No. 3-B Milwaukee, Plain
No. 3-B, No. 4-B Heavy Brown & Sharpe, pl.
No. 4 Cincinnati, plain
Nos. 1½, 2 B. & S. Universal
No. 2, No. 3, Cincinnati H.P. Vertical
No. 3-B Milwaukee Vertical
No. 5—48" Cincinnati Pl. Hydromatic

PLANERS
30"x30"x6', 9', 18' Cincinnati
36"x36"x8', 12', 18' Cincinnati
36"x36"x24' Gray
42"x42"x30' Niles Bement Pond, rev. m.d.
48"x48"x10' Det. & Harv., O.S.
60"x48"x20' Hamilton
72"x60"x16' American

TURRET LATHES
No. 4 Warner & Swasey Univ.
No. 1-A Warner & Swasey
No. 2-A Warner & Swasey
No. 3-A Warner & Swasey, Timken Brgs.
No. 4-A W. & S., 7⅝" H.S.
No. 4-L Gisholt 9¼" H.S.



EMCO Rebuilt Tools

Before buying a rebuilt machine tool, check the standing of the rebuilding plant. Our new 11 acre plant equipped with the most modern equipment for completely and correctly rebuilding machine tools is second to none in the industry. Our staff of skilled mechanics, recruited from the great machine tool plants of Cincinnati, have an average experience of more than 15 years in machine tool work. Our financial responsibility is a guarantee of satisfaction to buyers. When in need of machine tools, get in touch with us. An average stock of 1500 machines offers a wide choice of late type modern machines. Send for our new Stock List No. 38.

LATHES

36"x28' American Geared Head, m.d.
36"x29' Johnson, cone
36"x11' American, cone
30"x11' American, cone
25" raised to 32"x12' LeBlond, cone

NEW 24"x17' Boye & Emmes Geared Head, arranged for vee belted motor drive thru 12 speed head, Timken Bearings throughout, regular equipment, taper attachment, oil pan. Latest type lathe shipped from factory May 14, 1937. Takes 11'3" between centers.

24"x10' Greaves-Klusman, cone
22"x10' Lodge & Shipley Selective Head, m.d.
24"x 8' Hendey Yoke Head
20"x10' Boye & Emmes, cone
20"x 6' Hendey Geared Head
16"x12' Prentice Geared Head
16"x 6' Hendey Geared Head
16"x 6' Hendey Yoke Head
42"x96" Niles-Bement-Pond Car Wheel Lathe, NEW

BORING MILLS

62" Niles Heavy Pattern, NEW
60" Gisholt, m.d. thru gear box
72" Niles, D.C. drive
42" Bullard Rapid Production
37" Niles, gear box
24" Bullard New Era
No. 2 Niles Horizontal, NEW
No. 1 Cleveland Horizontal, s.p.d.

PRESSES

No. 268¼ Toledo Toggle Drawing, weight 175,000 lbs.
No. 168¾ Toledo Toggle Drawing, weight 125,000 lbs.
No. 1½ Bliss Toggle Drawing
No. 1½ Bliss Cam
No. 6, 7 Minster O.B.I.
P2, P3, P4 Ferracute Stiles Type

PUNCHES AND SHEARS

No. 2 Badger Alligator
Cleveland Model EF Double End, m.d.
Hilles & Jones Type J Single End, 48" throat, weight 86,000 lbs., cap. 4" hole thru 1½" plate, like new, m.d.
No. 4 CNC Ryerson Double End Coping & Notching Machine, m.d.

ROLLS

20' Niles Shipyard Type, 1" cap. weight 154,000 lbs.
12' Niles Pyramid Type, 1⅛" cap.
62" Hilles & Jones Plate Straightening

PLANERS

48"x48"x15' Niles-Bement-Pond, 4 heads, reversing, m.d.
48"x48"x14' Niles-Bement-Pond, 3 heads, reversing, m.d.
42"x42"x12' Niles-Bement-Pond, 4 heads, reversing, m.d.
36"x36"x12' Niles, 4 heads, belted, m.d.
36"x36"x10' Niles-Bement-Pond, 2 heads, m.d.
30"x30"x10' G. A. Gray, belt, 1 head
28"x28"x10' Cincinnati, belt, 1 head
24"x24"x 6' Ohio, belt, 1 head
24"x24"x 6' G. A. Gray, 1 head, m.d.

MILLING MACHINES

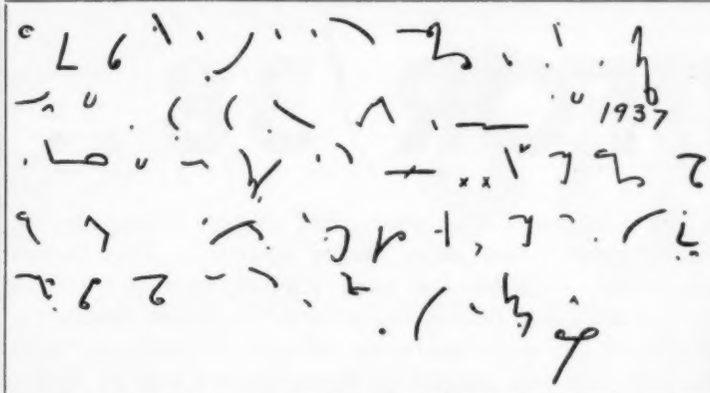
Nos. 1, 2 Cleveland Plain, s.p.d.
Nos. 2, 3, 4 Cincinnati Plain, m.d.
Nos. 1½, 3, 4 Cincinnati Plain, cone
No. 3 Kempsmith Plain, cone
No. 4 Kempsmith Plain Maxi-Miller, m.d.
No. 13B Brown & Sharpe Plain, National Standard Spindle
No. 25 Becker Plain, cone
No. 2 Brown & Sharpe Universal, cone
No. 2 Rockford Universal, s.p.d.
Ingersoll Vertical, m.d.
No. 4 B Becker Vertical, cone
No. 2 "K" Type Milwaukee Vertical, m.d. in base, Timken Bearings, National Standard Spindle
24", 48" Cincinnati Plain Automatic, m.d.
24" Cincinnati Duplex Automatic, m.d.
48" Oesterlein Tilted Offset, m.d.
No. 3—36" Cincinnati Duplex Hydromatic, latest type, like new

GRINDERS

No. 2F Norton Lapper, m.d., latest type, like new
No. 2 Brown & Sharpe Automatic Surface
No. 3 Wilmarth & Morman Automatic Surface
No. 33 Abrasive Vertical Surface, m.d. in base
No. 78 Wilmarth & Morman Automatic Surface, m.d. in base
20x144" Landis Plain Self-Contained Cylindrical, md.
16x52" Landis Plain
12x72" Landis Plain
No. 4 Landis Universal
No. 3 Brown & Sharpe Universal
No. 11 Giddings & Lewis Teromatic
Nos. 50, 55, 60, 65 Heald Cylinder
No. 70 Heald Internal

THE EASTERN MACHINERY CO.

1002 TENNESSEE AVE. CINCINNATI, OHIO



"We take this opportunity of wishing all of our customers A Happy and Prosperous New Year, and thanking them for helping to make the year 1937 the biggest year in the history of our Company.

By modern equipment and methods, we have brought the rebuilding of machine tools up to a modern art, and will continue improving such methods, in order to secure your future patronage."

Sincerely,

Charles A. Simmons

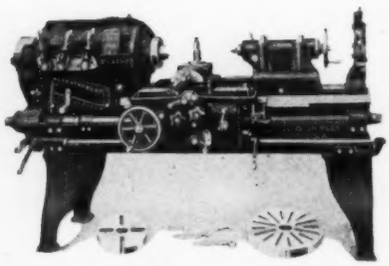
SOME OF OUR LARGE MACHINES FROM STOCK

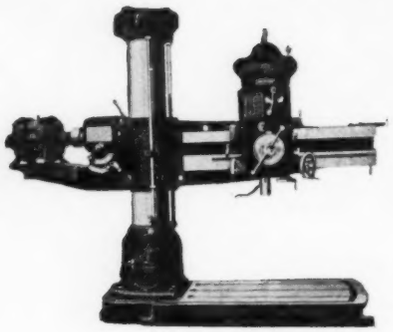
100″ x 50′ Niles B. P. Heavy duty lathe
96″ x 54′ Niles B. P. Lathe
90″ Niles B. P. Wheel lathe
84″ x 29′ Niles B. P. Extra heavy duty lathe
42″ x 22″ Niles B. P. Extra heavy duty geared lathe
48″ Niles B. P. Wheel lathe
36″ x 26′ Lodge & Shipley geared head
30″ x 16′ Houston Stanwood and Gamble heavy duty lathe
48′ x 74′ N. B. P. Heavy duty geared head lathe
#5-C, #2A, Model SD and CS Becker vertical millers
#2 Cincinnati Hi-Power vertical miller
#3-B Milwaukee Hi Power Plain Miller, S. P. D.
#5 Cincinnati Hi-Power Plain miller
#4B Brown & Sharpe heavy duty miller
Various Ingersoll planer type millers
16′ Niles Vertical Boring Mill
10-16′ Betts heavy duty vertical boring mill
10′ Betts vertical boring mill
96″ Niles vertical boring mill
90″ Pond vertical boring mill
60″ Niles vertical heavy duty boring mill
60″ Colburn vertical boring mill
36″-44″ Niles vertical lathe
36″ Bullard New Era Vertical Mill with Side Head
#45 Giddings & Lewis horizontal boring mill
7″ Bar D & H Floor-Type Horizontal Mill
6″ Bar Espen-Lewis horizontal boring mill
#1, 2 and 6 Barrett horizontals
162″ x 92″ x 42′ N. B. P. Hv. D. Planer
92″ x 92″ x 42′ N. B. P. Hv. D. Planer
84″ x 84″ x 20′ Niles B. P. Planer
84″ x 60″ x 14′ Niles B. P. Planer
72″ x 72″ x 12′ N. B. P. Heavy Duty Planer
56″ x 56″ x 12′ N. B. P. Heavy Duty Planer
56″ x 48″ x 10′ Cincinnati Heavy Duty Planer
48″ x 42″ x 20′ Detrick and Harvey Open Side Planer
72″ Bement Rotary Planer
100″ Gould and Eberhardt horizontal Hobber
30″ x 144″ Landis Plain Cylindrical Grinder M.D.
1—18″ x 84″ Landis plain cyl. grinder
1—14″ x 72″ Horton plain cyl. grinder
#2, #3, #4 Brown & Sharpe Universal Grinder
#13 Brown & Sharpe Universal Grinder
5′—6′ Cin.-Bickford Plain radial M. D. drill
1—5′ Niles Right line plain radial drill
1—5′ American triple purpose plain drill
1—40′ x 1″ Southwark bending rolls
10 x ⅜″ Ohls Brake
#3-½ Baker Keyseater
13′ x ½ Niles Bement Pond Bending Roll

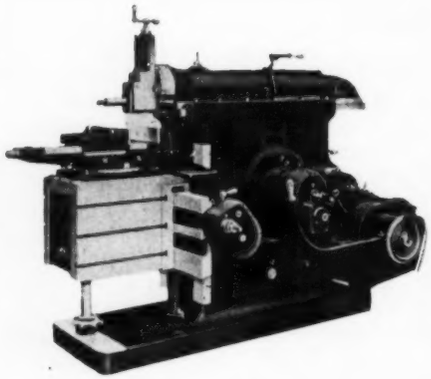
SIMMONS MACHINE TOOL CORPORATION

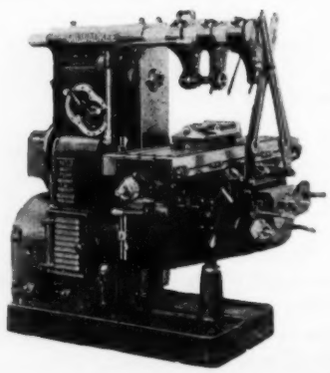
ALBANY, NEW YORK — *WRITE FOR LATEST STOCK LIST* — NEW YORK CITY—149 BROADWAY

ALL SET FOR '38 . . .









● The Cincinnati Machinery and Supply Company recently moved into new, larger quarters. This means additional facilities for even greater service in 1938 . . . more space permitting a more complete inventory. Machines having a minimum amount of profit can now be held for sale instead of being forced out by larger pieces of equipment. To *you* . . . our new setup offers a wider range of used tools to choose from and immediate shipment of models you need.

LATHES

12"x6' Sebastian Grd Head Lathe, M.D. Taper.
14"x6' Lodge & Shipley Sel. Grd. Hd. Taper, S.P.D.
16"x6' American Grd. Hd. S.P.D.
16"x8' Hendey 4 S.C.D. Yoke Head.
18"x14' Monarch Grd. Hd. M.D. Taper.
20"x40"x8' Rahn Larmon Lathe, Sliding Bed. Q. C.
20"x14' Hendey Lathe, 4 S.C.D. B.G. Q.C. Yoke Head
20"x25' American High Duty Lathe, 3 S.C.D. Q. C.
21"x10' LeBlond Grd. Hd. S.P.D.
24"x12' American Cone Head 3 S.C.D. D.B.G.
24"x12' Lodge & Shipley 3 S.C.D. D.B.G.
24"x22' Bradford 4 S.C.D. D.B.G.
26"x14' Bridgeford Grd. Hd. S.P.D.
27"x16' Lodge & Shipley Sel. Grd. Hd. Taper.
28"x18' Bradford 3 S.C.D. D.B.G.
30"x12' American 3 S.C.D. D.B.G.
36"x24' Lodge & Shipley Sel. Grd. Hd. 18 Spd. S.P.D. Taper.
36"x 6' LeBlond Trip. Grd. Cone Drive. Q.C. Boring Attach.
42"x18' Bridgeford Grd. Hd. S.P.D.
42"x20' American Grd. Hd. Taper, M.D.

GRINDERS

5"x18" Ott Grinder.
6"x18" Landis Self Cont.
10"x36" Land s Self Cont.
#50, 55, 60 & 65 Heald Internal.
#2 Brown & Sharpe Surface Grinder.
#78 Wilmarth & Marmon Grinder, Surface.
12"x72" Cincinnati Plain Grinders, like new.
#5 Abrasive Surface Grinder, M.D. like new.
60" Blanchard Surface M.D.
14" Pratt & Whitney Surface Grinder, XX Bel.
84" Diamond Grinder.

GEAR CUTTERS

#6 Fellows Gear Shaper.
#624 Fellows Gear Shaper.
#1 and 3 Adams Farwell Gear Hobbers.
18HM G. & E. Hobber.
6" & 11" Gleason Bevel Gear Generators.
#12 Barber Colman Hobbers.
#3—26", #3—36", #4—36", #4—48" Brown & Sharpe Automatic Gear Cutters
#5 Newark Gear Cutter.

BOLT AND PIPE THREADERS

1", 2", 2½", 3" Landis Bolt Cutters.
1", 1¼", 2" Acme Bolt Cutters.
2", 4", 6" Oster Pipe Machines.
2" Landis Pipe Machine.

BORING MILLS

24" Bullard Rap. Prod. S.P.D.
42" Colburn, Rap. Trav. 2 Hds. Arr. M.D.
60" Cincinnati Heavy Duty Arr. M.D.
2½" Universal Horz. S.P.D.
#1 Barrett Cone Drive.

MILLING MACHINES

24" Cincinnati Automatic.
#3—48" Garvin Duplex.
#33 Kempsmith Production.
#2 Hendey Universal Complete.
#2 Kempsmith Universal Complete.
#2B Milwaukee Plain Miller S.P.D.
#2½ Rockford Univ. Miller.
#3 Kempsmith Cone Univ.
#3 Cincinnati Cone, Univ.
#4 Cincinnati Cone H.P. Plain.
#4 Cincinnati Cone H.P. Univ. Complete.

PLANERS

24x24x6 Gray.
24"x24x8 Gray.
26"x26"x8' Cleveland Openside.
30x30x16 Gray.

RADIALS AND SHAPERS

3, 4, 6' American Trip. Purpose.
2½', 6' American Trip. Grd.
16, 20, 24" Gould & Eberhardt Cone.
16, 20, 24" Gould & Eberhardt S.P.D.
Varied Stock other cone drive shapers.

No. 2-A WARNER & SWASEY Universal Hollow Hexagon Turret Lathe, TIMKEN BEARING, Motor Driven. Used very little. Practically new.

WRITE TODAY *for the new Cincinnati Catalog. We Buy; Sell or Exchange*

CINCINNATI MACHINERY & SUPPLY CO.
217 E. Second St. Cincinnati, Ohio

HIGH QUALITY

LOW PRICES

ABSOLUTE RELIABILITY

CONVENIENT LOCATION

SUN

LARGE STOCK

PROMPT DELIVERIES

EXPERT WORKMEN

LONG EXPERIENCE

EVERY MACHINE RECONDITIONED and Guaranteed Ready for Money-Saving Performance in Tool Room or Shop

VERTICAL BORING MILLS

10' Niles, 2 swivel heads, Cone Drive.
72" Gisholt, 2 swivel heads, Power Rapid Traverse, Motor Drive.
54" Colburn, 2 swivel heads, Single Pulley Drive.
48" Colburn, 2 swivel heads, Single Pulley Drive.
42" Bullard, 2 swivel heads, Single Pulley Drive, Power Rapid Traverse.
42" Gisholt, 1 plain and 1 turret head, Power Rapid Traverse, Motor Drive.
14" Bullard, 6 Spindle MULT-AU-MATIC.

VERTICAL TURRET LATHES

24", 36", 42" Bullard New Era Type Motor Drive.

HORIZONTAL BORING MILLS

4½" bar Niles-Bement-Pond Table Type, Duplex Control, Rapid Traverse, Motor Drive.

LATHES

60"x22' Putnam, with raising blocks to swing 80", Cone Drive.
30"x17' Houston, Stanwood & Gamble, Cone Drive.
24"x12' American Geared Head, Motor Drive.
16"x8' Lodge & Shipley Selective Geared Head, Motor Drive.
12"x8' Lodge & Shipley, Cone Drive, Taper Attachment, Collets.

GRINDERS

No. 16 Blanchard Direct Motor Drive, 26" chuck.
No. 3 Wilmarth & Morman Surface; capacity 8"x24"; Magnetic Chuck, Belt Drive.
No. 13 Brown & Sharpe Universal and Tool, Belt Drive.
No. 2 Brown & Sharpe Universal, Internal Attachment.
No. 1 Brown & Sharpe Universal, Motor Drive.
No. 1 Webster & Perks Universal; capacity 10"x30"; Belt Drive.
No. 3 Bryant Internal, Motor Drive.
No. 1 Fraser Universal Tool & Cutter, Belt Drive.
No. 65 Heald Internal, Belt Drive.
No. 70 Heald Internal, Belt Drive.
84" Diamond Face, Motor Drive.

MILLING MACHINES

No. 5 Cincinnati Plain Geared Head, Rapid Traverse, Motor Drive.
No. 4 Cincinnati Plain Geared Head, Rectangular Overarm, Rapid Traverse, Intermittent Feed, Single Pulley Drive.
No. 4 Cincinnati Vertical, Single Pulley Drive.
No. 3B Milwaukee Vertical, Rapid Traverse, Motor Drive.
No. 2½B Milwaukee Vertical, Motor Drive.
No. 15 Garvin Vertical, Geared Drive with Countershaft.
No. 4 Brown & Sharpe Plain, Cone Drive.
No. 3 Kempsmith Plain, Cone Drive.
No. 2 LeBlond Universal, Cone Drive.

AUTOMATIC SCREW MACHINES

2⅝" Gridley Model "G" 4-Spindle, Motor Drive.
1¼" Gridley Model "G" 4-Spindle, Single Pulley Drive.
⅞" Gridley Model "G" 4-Spindle, Single Pulley Drive.
1¼" Cone 4-Spindle, Motor Drive.
4½" Gridley Single Spindle, Motor Drive.

TURRET LATHES

26" Libby, 7½" hollow spindle, Motor Drive.
26" Libby, 4½" hollow spindle, Motor Drive.
24" Gisholt, 6¼" hollow spindle, Cone Drive.
No. 5 Foster Geared Head, 2⅛" hollow spindle, Single Pulley Drive.
3"x36" Jones & Lamson, with Bar and Chucking Equipment, Single Pulley Drive.

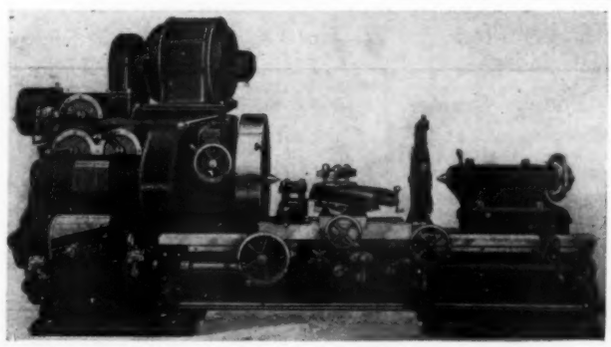
RADIAL DRILLS

6' American Triple Purpose, Single Pulley Drive thru gear box.
3½' Cincinnati Bickford, Single Pulley Drive thru gear box.

MISCELLANEOUS

DRILL, No. 1-S Garvin Duplex Horizontal.
HAMMER, 300-lb. Bradley Helve.
PIPE MACHINE, 10" Standard Engineering Co., Motor Drive.
PIPE MACHINE, 6" Stoever, Motor Drive.
PRESS, 50-ton Lucas Forcing, Motor Drive.
PRESS, 6" Horizontal Hydraulic Forcing; capacity 80 tons.
PUNCH, No. 5 Hilles & Jones Multiple; Motor Drive.
SHEAR, No. 2 Hilles & Jones Squaring; capacity 74"x¼"; with 28" gap; Motor Drive.
SLOTTER, 48" Niles-Bement-Pond, Motor Drive.

Always in the Market to Purchase Single Items or Entire Plants of High-Grade Machine Tools.



AMERICAN LATHE

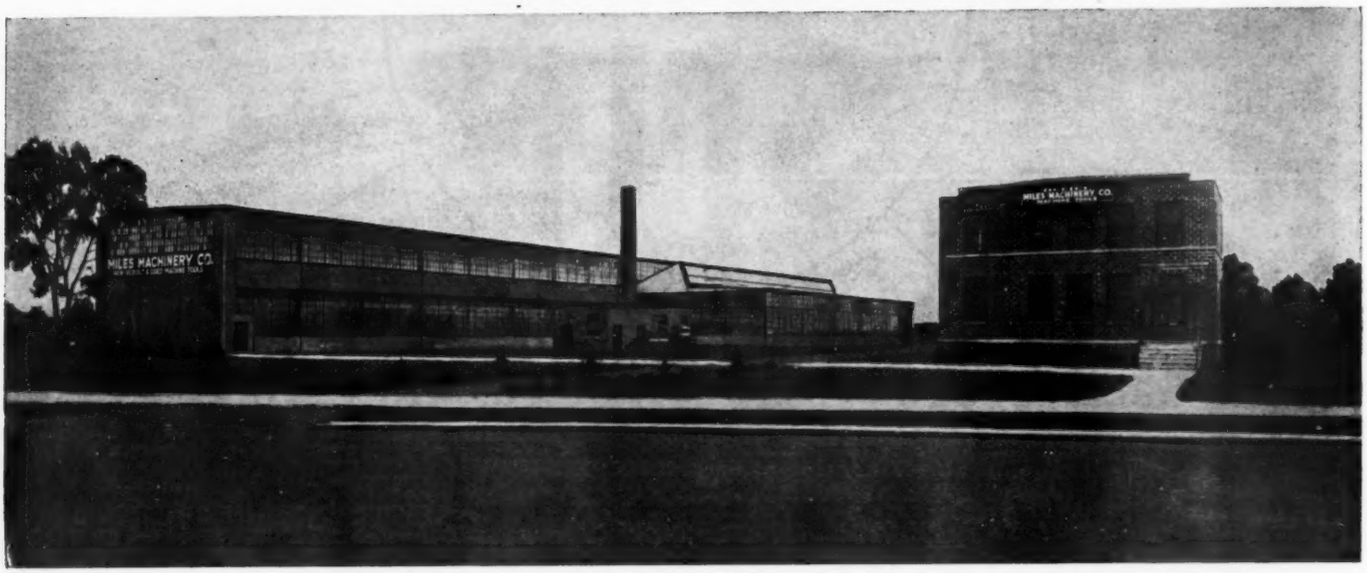
42" x 27-ft., AMERICAN HIGH DUTY ENGINE LATHE. PRACTICALLY NEW. 16 SPEED GEARED HEAD—MOTOR DRIVEN—APRON CONTROL QUICK CHANGE GEAR—INTERNAL FACE PLATE DRIVE.

Swings over Bed	44½"
Swings over Compound Rest Slide	30⅝"
Distance between Centers, tailstock overhung	20 ft.
Hole through Spindle to clear bar	2 1/16"
Taper of Centers, Morse	No. 6
Power Angular Feed to Compound Rest	15"
Weight approximately	35,000 lbs.

Write for Price for Quick Delivery.

SUN MACHINERY CO., INC.

36 VAN VECHTEN STREET **NEWARK, N. J.**



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An Organization you can *Depend* on—

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4—#40 Anderson Dial Tapping Machines, M.D.

16—#OOG Brown & Sharpe Auto. Screw Machines.

4—#OG—Automatics.

2—#1A Gorton, M.D. Engraving Machines.

3 WAREHOUSES of GOOD MACHINERY

No. 1 Kearney & Strecker Vertical Miller.

14″ Pratt & Whitney Surface Grinder.

No. 33 Abrasive Grinder.

No. 1 Diamond Grinder.

No. 22 Heald Rotary Grinder. Auto. Feed.

No. 1 Brown & Sharpe Universal Grinders.

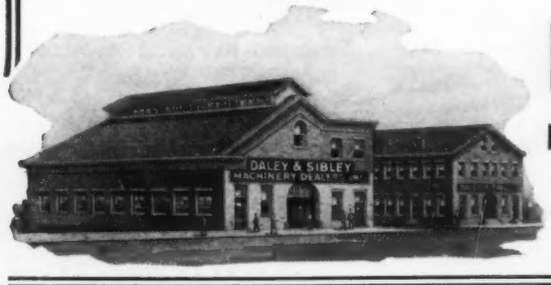
16″x6′ Lodge & Shipley Geared Head Lathe, M.D.

3″x12′ Pratt & Whitney Thread Millers.

6—#10 & #11 Brown & Sharpe Plain Grinders, S.P.D.

4—#3 Van Norman Internal Grinders.

2—No. 2 Pratt & Whitney Die Sinkers.



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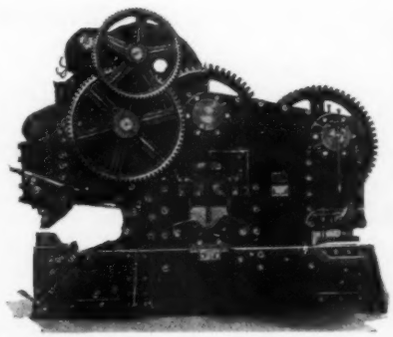

BUFFALO No. 29-U — Armor Plate Universal Iron Worker—triple combination. Net weight about 40,000 lb.

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N.B.P. No. 1½ portable, 3⅞" bar horiz.
BEAMAN & SMITH 5" bar horiz.
BULLARD 24" vert.
BULLARD 42" New Era Type Vert.
N.B.P. 42", 44", 51", 52" vert.
COLBURN 54", 2 swivel hds. vert.
POND 90", 2 hds. vert.
NILES 10' vert.

PLANERS

CLEVELAND 48"x48"x16'; 4 heads opensides
AMERICAN 36"x36"x20'; 3 hds.
CINCINNATI 36"x36"x12'; 2 hds.
N.B.P. 48"x48"x16'; 4 hds.

LATHES

NILES BEMENT POND 46"x15', Q.C.G.
PITTSBURGH 36"x28', grd. hd.
PUTNAM 36"x28', 3 step cone, D.B.G.
PUTNAM 36"x28', grd. head—Nearly New
BRIDGEFORD 36"x60' comb. boring and turning
BRIDGEFORD 36"x60' boring
McCABE 27-49x16' Double Spindle
LODGE & SHIPLEY 24"x10' cone dr.
GREAVES & KLUSMAN 16"x8' motor-in-base
PRATT & WHITNEY 16"x8' grd. hd. toolroom

MILLING MACHINES

BROWN & SHARPE No. 1 Vert.
CINCINNATI 24", 48" Automatic
INGERSOLL No. 3 Combined heavy duty Vert.
INGERSOLL 24"x24"x12', planer type
INGERSOLL 24"x24"x12', slab
NEWTON No. 2 Ver. spindle keyseat
BROWN & SHARPE No. 4 Universal cone dr.
CINCINNATI Nos. 2, 3, 4 Plain
LEES BRADNER No. 4 thread
PRATT & WHITNEY 4½x12, 6x48, 6x80 thread
BECKER C-1 and C Vertical
BROWN & SHARPE No. 4 Universal cone dr.
KEARNEY & TRECKER No. 1B Vert. P.R.T.

DRILL PRESSES

NATCO No. 12, No. 13, No. 22 Multiple spdle.
NATCO C11 Drill—mechanical feeds
NATCO C13H Drill—hydraulic feeds
PRATT & WHITNEY No. 12 rect. head

DRILLS—RADIAL

AMERICAN 3', 5' triple purpose
CINCINNATI BICKFORD 5' full Univ.
DRESES 3' and 5' Pl. SPD.
REED PRENTICE 4' Pl.

MOREY MACHINERY CO., INC
410 BROOME ST. NEW YORK

42" BULLARD New Era Type Vertical Turret Lathe—
side head, cutting lubricant system

GEAR CUTTING EQUIPMENT

BROWN & SHARPE No. 4, 48" Gear Cutter
BARBER & COLEMAN Nos. 3 and 12 Gear Hobbers
GOULD & EBERHARDT 18", 36" Hobbers
CLEVELAND 8 spdle. Spline Hobber
GLEASON 15" Spiral Gear Finisher
GLEASON 10" Spiral Bevel Gear
FELLOWS No. 8B Burnisher
FELLOWS Nos. 6, 61, 615
FELLOWS Nos. 7, 71
LEES BRADNER Lapper, cap. 1¼"x8"

GRINDERS

BRYANT No. 3 Internal
PERSONS ARTER 12" Rotary surf.
HEALD Nos. 50, 55, 60, 65 intl.
HEALD No. 72 Hydr.; 72-A-3 Sizematic
LANDIS 10x24, 10x36, 10x72
DIAMOND 48" type H Surf.
NORTON type B3i 14x30x36" crankpin
DIAMOND 84" Face
PRATT & WHITNEY No. 14 surface

MISCELLANEOUS

FOSTER No. 1B, No. 3B Univ. Turret Lathe
BROWN & SHARPE No. 2F, No. 6F Screw Mach.
CLEVELAND ⅜"; 2-2½"; 2¼-2¾" Model "A"
TREADWELL 12" pipe mach.
LIBBY 18" model "A", 26"—7½" hole
LYND FARQUHAR 26" Shaper sgle. hd.
PRATT & WHITNEY No. 12 Profiler, grd.
GLEASON 12" Cutter Sharpener
REED PRENTICE No. 3 vert. die sinker, late type
ACME, 2" all steel Upsetter
NAZEL No. 2B Hammer
TOLEDO No. 5½ D.C. Power Press
HENRY & WRIGHT 50 ton Die Press

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FOR DEPENDABILITY . . . FOR PRODUCTION . . . FOR PROFITS
THE RESULTS OF 30 YEARS OF EXPERT KNOWLEDGE . . .

BORING MILLS—HORIZONTAL
2½" Universal Boring Mill
3½" Landis Boring Mill M. D.

DRILLS—RADIAL
3–5' American Radial Drills
6' American Triple Purpose Radial Drill

GEAR MACHINERY
#5—60" Gould & Eberhardt Gear Cutter
#4—48" Brown & Sharpe Auto. Gear Cutter
#55—36" Newark Gear Cutter
Gleason Bevel Gear Tester M. D.

GRINDERS—PLAIN
10" x 18" Norton Plain Grinder M. D.
10" x 72" Norton Plain Grinder M. D.
14" x 72" Norton Plain Grinder M. D.
14" x 36" to 42" Norton Model 81 Type B Crank Pin Grinders

GRINDERS—INTERNAL
#70 Heald Duplex Grinder
#70 Heald Internal
#72 Heald Internal 3 Motor Drive
#72A3 Heald Sizematic 2 Motor Drive

SPECIALS

GRINDERS—UNIVERSAL
#1 Brown & Sharpe Universal M. D.
#1, #2, #3 and #4 Brown & Sharpe Univ. Grinders
#21 Brown & Sharpe Univ. Grinder

GRINDERS—SURFACE
14" PRATT & WHITNEY VERT. B. B. SURFACE
#16 and #16A Blanchard M. D. Vert. Surface
#33 Abrasive Vert. Rotary Surface
#255 Heald Rotary Surface

HEADERS
5—#0 Waterbury Farrel D. S. S. D. M. D.
2—#1 Waterbury Farrel D. S. S. D. M. D.
#5 Waterbury Farrel D. S. S. D. Geared

LATHES
16" x 8' Hendey Yoke Head Lathe
18" x 8' Lodge & Shipley Geared Head Lathe
24" x 14' American Geared Head Lathe
26"–48" x 15' McCabe Two-in-one Lathe
26"–48" x 24' McCabe Two-in-one Lathe

MILLERS PLAIN
#2B Brown & Sharpe Heavy S. P. D.
#4 Cincinnati Rectangular Overarm S. P. D.

MILLERS UNIVERSAL
#2 Brown & Sharpe Universal Cone Drive
#3A Brown & Sharpe Universal M. D.
#2 Van Norman Duplex, with heads

SCREW MACHINES
All sizes of Brown & Sharpe Automatics
5½" and 6¾" Model A Cleveland Automatics

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DESIRABLE MACHINES

QUICK DELIVERY

Air Compressor, 9x8" I-R., "ER-1."
Blower & Exhauster, 35 Buffalo, 5 HP. motor.
Furnace, 25x23x12" I.D., Tate-Jones.
Grinder, ½ HP. 1/60/110 V. Port. Flexible Shaft.
Hammers, Power, 50 & 200 lbs., M.D.
Lathe, 12"x6' Hendey G.H., MD; TA., D-I.
Lathe, 16"x10' Greaves-Klusman G.H., MD; TA.
Miller, 4-spdl. Ohio, range: 72x30x20".
Pipe Machine, 18" Wieland, for M.D.
Planer, 36"x36"x10' Liberty. 2 Heads M.D.
Press, #19 Bliss O.B.I., 2" stroke.
Reeves Variable Speed, #00-E, ratio 4:1., 2 HP.
Riveter, #3-A. Grant, capacity 5/16", M.D.
Saw, Peerless Univ. Shaping 6x6", M.D.
Saw Band, 20" Clark "JM", for M.D.
Shaper, 24" G. & E. "Invincible", 230 V. DC. Motor.
Speed Reducers, 2 HP. Foote, 53:1. (new)
Tumbling Barrel, Globe, 20"x17", M.D.
Turret Screw Machines, No. 1 & 2. B&O. W.F.
Turret Screw Machines, No. 4 W & S, W-F., P.F.

Partial List send us your inquiries

MARR-GALBREATH MACHINERY COMPANY
58 WATER ST. PITTSBURGH, PA.

LATE ARRIVALS IN STOCK

LATHES—

14 x 6—SIDNEY—Cone Drive
16 x 8—AMERICAN—Cone Drive, Taper Att.
18 x 8—SCHUMAKER BOYE & EMMES—Cone Drive
17 x 11—LEBLOND—Geared Head
30 x 12—LODGE & SHIPLEY—Cone Drive, Taper Att.
No. 4—WARNER & SWASEY—Universal Turret, Bar Feed

MILLING MACHINES—

No. 1—CINCINNATI UNIVERSAL—Cone Drive
No. 2—CINCINNATI PLAIN—Cone Drive
No. 3—CINCINNATI PLAIN—Cone Drive
No. 3—KEMPSMITH PLAIN—Cone Drive
No. 13-B—BROWN & SHARPE

GEAR CUTTERS—

No. 5-A—LEES & BRADNER
No. 3—BARBER COLMAN
No. 12—BARBER COLMAN
15"—GLEASON—Spiral
No. 5—60" BROWN & SHARPE

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with
WIGGLESWORTH EQUIPMENT

No. 3 Cincinnati Universal Miller
No. 4 Cincinnati Plain Miller, Rapid Traverse
No. 21 Lucas Horizontal Boring Mill
20" x 12' Monarch Lathe, Gd. Hd. Taper
24" x 15' American Lathe, Gd. Hd. Taper
4½" x 12" Pratt & Whitney Thread Miller
6" x 80" Pratt & Whitney Thread Miller
1" and 1½" Warner & Swasey Hand Screw Machines
No. OY Brown & Sharpe Semi Automatic Millers

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Our used machine tools are entirely gone over, and before any deliveries are made a thorough inspection is made by our competent mechanics. This insures every machine sold by us to give guaranteed service and performance. Listed below are but a few machines from our large stock. Send your inquiries—immediate deliveries.

#31 Lucas Horizontal Boring Mill, motor drive.

2—#2B Milwaukee Plain, Double Overarm Millers, SPD.

#3 Cincinnati Vertical Miller, slotted nose, rapid traverse, motor drive.

Brown & Sharpe & Cincinnati #2 Universal Mills complete.

2—#4 Warner & Swasey 12 speed, Timken Bearing, motor in base **Universal Turret Lathes,** complete.

Monarch Timken Bearing, Motor Drive, 16" to 24"x 10' **Gap Lathe,** taper attachment, chucks, drawbar & collets

Sidney Monotrol 20x6 Timken Bearing, Motor in Base **Lathe.**

Lodge & Shipley & Hendey 14"-16" and 20" **Lathes.**

Hendey V Ram, 16" Motor Drive **Shaper.**

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Inventory of one of the leading automobile and trailer manufacturers which cost them hundreds of thousands of dollars. It is classified in different rooms, in the following manner:

ROOM NO. S-1 CONTAINS:

Trailer parts and accessories, such as hinges, pumps, latches, knobs, sink drains, braces, fuse plugs, handles, bulbs, etc.

ROOM NO. S-2 CONTAINS:

Thousands and thousands of square feet of gum and maple veneer.

ROOM NO. S-3 CONTAINS:

Thousands and thousands of square feet of fir plywood, along with quite a number of automobile parts.

ROOM NO. S-4 CONTAINS:

Hardware, consisting of locks and other manufacturing parts, such as mufflers, tubing, etc.

ROOM NO. S-5 CONTAINS:

Assortment of tires for automobiles and trailers which are all brand new, some still in the original wrappings which are Goodyear, Goodrich and Firestone, and all other standard makes. There are also quite a number of tubes stored in this room.

ROOM NO. S-6 CONTAINS:

Frames for automobiles and also manufacturing parts.

ROOM NO. S-11 CONTAINS:

Trailer materials, such as aluminum, steel, paint, grease, window frames, etc.

ROOM NO. S-12 CONTAINS:

Paints, grease, oils and other maintenance materials which are still in the original drums which have never been opened.

ROOM NO. S-17:

This is called the Steel Room and contains sheet steel, strip steel, steel angles, tool steel, blue enameled hot rolled steel and all different kinds which are needed in the manufacturing of automobiles. Inventoried for approximately $45,000.

ROOM NOS. S-32, S-39 AND S-40 CONTAINS:

Calipers, 24 to 36" scales. Micrometers from 1" size to 18" and to 19", principally Slocomb. Brown & Sharpe tube micrometers 2½ to 3" to 19". Johannsen gauges and holders. Bar micrometers, indicators, heads, cutters, protractors, depth micrometers, incide micrometers, straight edges, side mills, cutters, face mills right and left hand, toggle reamers, machine reamers, drills, plug gauges from 3/16" to 4". Male and female thread gauges all sizes and threads. And many other kinds of precision tools.

ROOM NO. S-18 CONTAINS:

Tubing of all descriptions, along with quite a number of standard bearings and parts.

ROOM NO. S-19 CONTAINS:

Trailer material consisting of linoleums, sinks, stoves both gasoline and coal, screws, bolts and nuts and quite a number of other items which were necessary to build trailers.

ROOM NO. S-20 CONTAINS:

Approximately 90 to 100 ton of standard screws, bolts and nuts.

ROOM NO. S-21 CONTAINS:

Glass which is still in the original crates, copper tubing and wiring and quite a bit of other electrical equipment.

ROOM NO. S-25 CONTAINS:

Tool steel, also quite a large quantity of copper and brass.

ROOM NO. S-26 CONTAINS:

Automotive parts and quite a number of these items are standard.

ROOM NOS. S-27, S-28 and S-29 CONTAINS:

Automobile trim materials, such as upholstering silks, curtaining, upholstery for trailers, cotton batting, carpet, leather, thread, tapestry, etc.

ROOM NO. S-30 CONTAINS:

Radios for trailers and automobiles, along with quite a number of radio parts, floor rugs, etc.

ROOM NO. S-31 CONTAINS:

Automobile accessories and furnishings for trailers, such as dishes, lanterns, telephone systems, aluminum ware, lap robes, gasoline stoves, fur rugs, and all items necessary to completely furnish trailers.

ROOM NO. S-36 CONTAINS:

Paints of all descriptions, lacquer, castor oil, turpentine, alcohol, etc.

ROOM NO. S-38 CONTAINS:

Machine repair parts, along with quite a large amount of aluminum, brass, copper, etc.

ROOM NO. S-16 CONTAINS:

Maintenance parts. Inventories for over $70,000 and consists of anything that might be necessary to maintain an automobile plant, such as drills, cutters, rope, cable, copper, brass, welding materials, spray guns, plumbing equipment, gauges, etc. Most of this material is still in the original cartons and wrappings.

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6' Fosdick Gear Box,
5' Dreses Gear Box,
4' Western Gear Box.

DRILLS
3—No. 310 Baker,
No. 216 Baker,
24" Cincinnati Sliding Head.

MILLERS
No. 4 Cincinnati Universal,
No. 4. Becker Plain,
No. 2 Rockford Plain, Vertical Attachment.

BORING MILL
34" Gisholt Vertical.

BOLT CUTTERS
No. 734—1 ½" Greenfield,
No. 736—2" Greenfield.

AUTOMATICS
No. 0 Brown & Sharpe with slotting attachment,
⅛—⅞" Cleveland Model B,
⅛—1¼" Cleveland Model A.

LATHES
7"x 3' Dalton,
12"x 5' Worcester,
13"x 4' South Bend,
14"x 8' American,
16"x 8' LeBlond,
16"x10' South Bend,
18"x12' Hendey,
20"x 8' Lodge & Shipley,
20"x 8' Prentice,
22"x10' Davenport.

HYDRAULIC PUMPS
2¼"x6" Deane Vertical Triplex 750#,
2—1½"x6" Platt Vertical Triplex 1000#,
2—½"x4" Worthington Vertical Triplex 10,000#.

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522 C.F.M. 13"x14" Worthington,
2—368 C.F.M. 12"x10" Ingersoll Rand Class ER-1,
366 C.F.M. 12"x10" Penna. Class 3A,
148 C.F.M. 8" & 4½"x8" Penna. Two Stage, 250#,
355 C.F.M. 12"x12"x10" Ingersoll Rand Class FR-1,
245 C.F.M. 12"x10"x10" Ingersoll Rand Class FR1.

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1½ Ton Euclid, Three Motor, A.C., 26' Span.

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BORING MILLS
8' Niles, PRT, M/D
54" Bullard, PRT, M/D
42" Bullard, PRT, SPD
3½" Bar Landis, No. 35 Floor
3" Bar Defiance, table type, M/D

RADIALS
5' American Triple Purpose
4' American Triple Purpose
32" Cincinnati Bickford, Tapping M/D, upright, compound table

GRINDERS
8" & 12" Heald Rotary
No. 103 Rivett
No. 70 Heald Internal
No. 13 B & S Universal
24"x96" Landis
26"x120" Landis
No. 2 Landis Universal
No. 2 B & S Surface
12"x36" Landis Plain
10"x36" Landis Plain
48" Badger face, hyd. feed
36"x12" Diamond Surface
84"x12" Diamond Surface
14" P & W Vert. Surface

LATHES
60"x30' Pittsburgh M/D
36"x30' NBP Grd. Hd.
30"x12' S & B, T. A.
24"x12' LeBlond Cone
22"x8' Lodge & Shipley
18"x8' Lodge & Shipley
16"x8' Reed Prentice, SPD

MILLERS
No. 5 Cincinnati, PRT
No. 3B Milwaukee, SPD
Nos. 3B Heavy, 2B Heavy & 2B Brown & Sharpe, SPD (3)
No. 3 Cincinnati Univ. Grd. Hd.

PLANERS
72"x72"x14' Betts, 4 hds.
72"x60"x16' D & H Open.
48"x48"x10' D & H Open.
36"x36"x14' NBP M/D
36"x8' D & H Open.
30"x10' D & H Open.

TURRET LATHES
No. 3 A Warner & Swasey
No. 4 W & S, Univ. Cone
24" & 21" Gisholts A.C. M/D
No. 5 Foster, 1 13/16", Cone
3¼"x36" Acme Grd. Hd.
2¼"x26" Acme, Cone

MISCELLANEOUS
PRESS, No. 12-7B Z & H Dble. Ck. 400 ton NBP Carwheel
ROLLS, 17'x1¼" Niles
10'x⅛" Mohr
SAWS, 10" Napier M/D
6" Avey Milband M/D
6" Peerless Univ.
SLOTTER, 15"-18" Dill
SHEARS, 156"x¼" United
126"x¼" United
BRAKES, apron 10'x10 ga. Chicago
8'x10 ga. Chicago
FLANGER, ½" McCabe Pneumatic
GEAR CUTTER, 11" Gleason
HAMMERS, 6B, 5N & 2B Nazels

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Production Machy.

B&S Automatics, #00, #0, #2
Gridley Automatics, MS, 4 Sp. Model G ⅞", 1¼"—1¾"
Natl Acme Automatics MS, 4 Sp. #52 & 56—2⅝", 2¾"—3"
New Britain 6 Sp. Bar Machine 1"x5"
Turret Lathes, all sizes & models
Warner & Swasey; Gisholt; Libby; Foster
Sizematic Grinder, G&L Terromatic
Barber Colman Gear Hobbers
Cone Automatics 4 Sp. & 8 Sp. all sizes
Detroit 5 Sp. Horizontal Drill

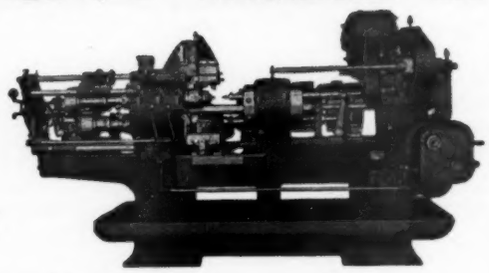
125 other tools

Note: Will buy for cash your surplus machines

HASCO, INC.
Herbert Action Segal, Mgr.
38 CLINTON ST., NEWARK, N. J.

CLEVELAND MODEL M

4-SPINDLE CHUCKERS



5—8" Cleveland Model M
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1—4" Cleveland Model M

Above machines motor drive; practically new condition
Purchased from the Grigsby-Grunow Co.
Ready for immediate delivery!

LOUIS E. EMERMAN & CO., 1763 Elston Ave., Chicago

PRICED TO SELL
We Are Liquidating Our Used Machinery

TURRET LATHE—#4 W&S, 6 speed, G.H., Univ.
TURRET LATHE—#6 W&S, Cone Drive.
TURRET LATHE—#2-A Cinc, Acme, G.H., M.D.
TURRET LATHE—48" Bul. Ver., 2 sw. hds., B.D.
PROFILER—#12 Two Spindle P&W, Arr. M.D.
SHAPER—16" Gould & Eberhardt M.D.
SURFACE GRINDER—#2 Brown & Sharpe, B.D.
GRINDER—#2 Cincinnati Cutter, B.D.
GRINDER—#14 Brown & Sharpe External, B.D.
GRINDER—Lees-Bradner Gear Tooth Grinder.
GRINDER—Norton Type A, 10"x24" Special Cam Grinder, M.D.
DRILL—#3 Bausch Multiple.
DUOMATIC LATHE—#3 x 6' Lodge & Shipley, Motor Driven and Tooled for cutting fins on aircraft cylinders. This machine is new and complete.

James W. George
3131 E. Jefferson Ave.
Detroit, Michigan

MILLING MACHINES, Plain,
VERTICAL, MANUFACTURED

1—#2 Cincinnati Pl. miller slot. nose, large dr. pulley.
1—#3 Cincinnati pl. miller slot. nose, rap. trav. m.d.
1—#3B B&S Pl. miller taper nose spdle, rapd. trav. m.d.
1—4B hvy. B&S pl. miller, pump, rap. trav. m.d.
1—#4 Cincinnati pl. miller slot. spdl. rap. trav. m.d.
1—4S Cincinnati pl. miller slot. spdle. rap. trav. m.d.
1—#5 Cincinnati pl. miller slot. nose rap. trav. m.d.
2—#5 Cincinnati rect. arm pl. millers, m.d.
1—#2 Cincinnati ver. miller, m.d.
1—3B Milwaukee Ver. miller, m.d.
2—#4 48" Cincinnati duplex auto. millers, m.d.
1—Newton dble. spdle. continuous miller 54" table.

We Carry a Full Stock of Used Machine Tools
Your Inquiries will be appreciated
THE STRONG, CARLISLE & HAMMOND CO.
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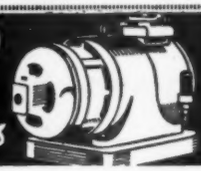
MOTORIZED *Speed Reducers*



Save up to 75%. Check with Moreco before buying. Hundreds of reducers in stock — immediate shipment. Completely overhauled and guaranteed like new. Speed reducer specialists. We buy, sell, exchange. Specify horsepower, speed ratios and application. Write

THE MOTOR REPAIR AND MANUFACTURING CO.
1548 HAMILTON AVE. • CLEVELAND, OHIO

HAVE YOU A JOB

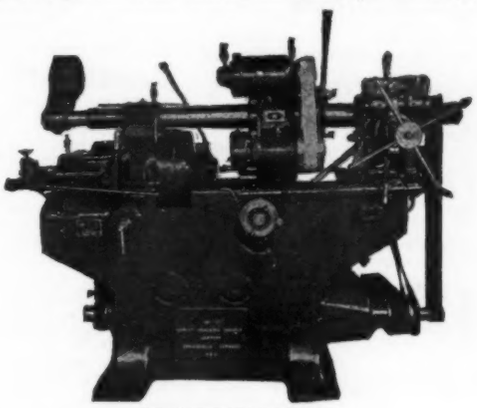
that requires both *INTERNAL* and *EXTERNAL* grinding which you would like to do in one setup?

Here is a machine which you can purchase at a very GREAT SAVING from the original cost of $4,400.00

Practically New

No. 12-A Bryant Semi-Automatic Two Spindle Grinders

(one spindle for internal work; the other for external work)



SPECIFICATIONS

Chuck swing 16"; maximum wheel slide traverse 11"; maximum grinding length 9"; two speeds to work spindle; adjustment for grinding tapers to 45° angle; water pump and piping carry water through driving wheel; arranged for motor drive and complete with two A.C. motors and electrical equipment.

We purchased these machines from the GRIGSBY-GRUNOW CO., of CHICAGO, manufacturers of "Majestic" Refrigerators and Radios, where they were used on a variety of work, where internal and external grinding was done in ONE CHUCKING.

An accurate finished part is insured with the surfaces being true and concentric with each other.

IMMEDIATE DELIVERY FROM STOCK

(Note: To responsible companies, we would be pleased to ship one of these machines on 30-DAY TRIAL.)

LOUIS E. EMERMAN & CO.

1763 Elston Avenue — CHICAGO, ILLINOIS

1—30" x 14' Ryerson-Conradson GH Lathe, quick change gears, 4" hole in spindle, built-in MD, TA.

1—25" x 18' LeBlond Lathe, 3-step cone, double friction back gears, large compensating Vee, clutch feed apron, TA.

1—2 x 24 Jones & Lamson Steel Head Turret Lathe, serial 40,070, bar equipment, MD.

1—52" Gisholt Vertical Boring Mill, AC MD, rapid traverse.

1—No. 13 Brown & Sharpe Universal T. & C. Grinder, MD.

2—24" Gould & Eberhardt Shapers; one gear box with universal table. One cone drive.

1—No. 58 Niagara Straight Side Geared Press, MD, 5" stroke, tierod frame.

1—No. 5 Toledo OBI Press, plain flywheel, 2½" stroke.

We solicit your inquiries

BUFFALO MACHINERY CO., INC.

837 Grant Street — Buffalo, N. Y.

UNUSUAL VALUES

1—16" Queen City Back Geared Crank Shaper
1—16" Steptoe Geared Crank Shaper
1—20" Smith & Mills Geared Crank Shaper
1—24" Gould & Eberhard ditto
1—14" Niles Travelling Head Shaper
1—36"x36"x14' Gray Planer, 2 heads
1—42"x42"x10' Gray Planer, 2 heads
1—30"x36"x12' Extra Heavy Pattern Gray Planer, 4 heads
1—36"x36"x14' Niles Planer
1—Ceiling Suspended Drill
1—Bausch Multiple Spindle Drill
1—5' Bausch Radial Drill

MOTORS—New 5 HP 3 phase, ball brg. $59.50, *other sizes equally low prices. Also rebuilt motors.*

The Osborne & Sexton Machinery Co.

COLUMBUS, OHIO

MACHINE TOOLS

1—14-7B Special Z&H 50 Ton Precussion Press.
1—Gisholt Precision Dynamic Balancer.
3—#14 B & S Cylindrical Grinders B.D.
1—6 Spdle. Holmes Tapper arranged m.d. motor.
4—8" Sundstrand Stub Lathes D. with motor.
1—10' #5 Hilles & Jones Straightening Rolls.
1—48x48x14' Hamilton Planer including motor, 4 heads box table.
1—Baker No. 50H Hydraulic "Twin Pull" Vertical Boring and Drilling Machine complete with 2 motors.

Your inquiries receive prompt attention

CENTRAL MACHINE TOOL CORPORATION

19-23 Lucas Street — Toledo, Ohio

Adams 1914

RECENT STOCK ADDITIONS

BAUSCH #2 Multiple Spindle Drill, 45 spindles, #2 M.T.

THIEL #3 Universal M.D. Die Filer.

DIAMOND #2 Surface Grinders, 12" x 36".

BRYANT #15-A Internal Chucking Grinder.

INDUSTRIAL MACHINERY COMPANY

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Indianapolis, Indiana

No. 3B D.A. Milwaukee Universal Miller —Vert. attach—S.P.D.
No. 4G Le Blond Plain Miller S.P.D.
4½' Morris Radial S.P.D. gear box
12x72 Landis Plain Grinder
24"x12' Greaves-Klusman Lathe, cone drive
14"x6' Hendey Lathe, cone drive
24" Gould & Eberhardt Shaper, cone drive
16" American Shaper, cone drive
20" Stockbridge Shaper, cone drive
No. 3 Mitts & Merrill Keyseater
30 Ton Lucas Power Forcing Press
6' and 10' Robinson Press Brake
16" Landis Crankshaft Grinders
Leland-Gifford 3 spindle drill with tapping heads No. 2 Morse Taper

IROQUOIS MACHINERY CO.

662 Ohio St. — Buffalo, N. Y.

THE BEST IN USED MACHINERY

LATHES — SHAPERS — MILLING MACHINES — GRINDERS — ETC.

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C. C. HOWARTH MACHINERY CO.

1440 FRANKLIN ST. — DETROIT, MICH.

ABSOLUTELY A-1

36"x36"x10' Liberty Planer, 2 Heads, Belted Motor Drive

Bargain—Immediate Delivery

W. E. BRANDT—*Machinery Sales*

513 Empire Bldg., Pittsburgh, Pa.

Automatic ⅞" "C" Nat. Acme. M.D.
Lathe Turret 2-A W & S 3¼" M.D.
24"x15' Prentice Lathe Geared Head.
60"x11" B & S Gear Cutter #5.
Lathe 42"x16' S-B. Q.C.G. B.D.

Machine Tools

Pipe Machines 4"-6"-8" Williams M.D.
Pipe Machine 2" Landis B.D.

4' Am. Radial Gear Box, S.P.D.
5' Cin. Bick Radial, M.D.
42" King Boring Mill. 2 hds., M.D.
42"x42"x12' Cin. Planer 3 Heads.
60"x60"x20' Planer Pond, 4 hds.

1210 HOUSE BLDG. WEST PENN MACHINERY COMPANY PITTSBURGH, PA.

REBUILT MACHINE TOOLS GUARANTEED

GRINDERS — LATHES — DRILL PRESSES — MILLING MACHINES
ALL TYPES AND SIZES OF METAL WORKING MACHINES

In Business 15 Years

PALMER EDWARDS COMPANY

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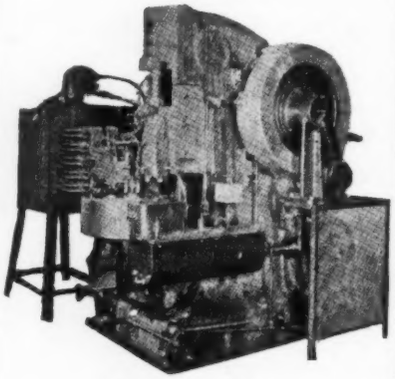

Complete with
all electrical equipment.
Priced low.

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1763 ELSTON AVE., CHICAGO, ILL.

WIRE WORKING MACHINERY

BAIRD Nos. 1, 2 & 3 Four Slides
MANVILLE Nos. 2, 3 & 4 Four Slides
NILSON Nos. 1, 2 & 3 Four Slides
BLISS No. 295 Auto. Ring Forming Machine
SHUSTER Wire Straighteners, all sizes
NATIONAL Nos. 2 & 4 Wire Nail Machines
WATERBURY FARREL Headers & Thread Rollers
WATERBURY FARREL No. 1 Step-Cone, Straight Roll & Bull Block Wire Drawing Machines
STANDARD Rolling Mills, 2½x6, 4½x7, 9x9 Roller Bearing type with take up stands

SHUSTER SPECIAL SHAPE STRAIGHTENER, Auto, Cut-off up to 12', 1" cross section capacity

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BLISS Nos. 1, 1½, 3½ & 5 Toggle Drawing
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FERRACUTE No. EG 54 Knuckle Joint, 400 ton
FERRACUTE Double Crank, 250 tons ram pressure
WATERBURY FARREL No. 04 Eyelet Presses

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KELLER No. E-2 Die Sinker, M.D., like new
PELS No. 16 Combination Ironworker, M.D.
BLISS and Max Ams Can Seaming Machines
QUICKWORK No. 10 & No. 25 Shears
STOLL 10'x3/16" cap. Power Shear, M.D.
GIBB 20 KVA & 50 KVA Elec. Seam Welders

NATIONAL MACHINERY EXCHANGE
128-138 MOTT ST. NEW YORK, N. Y.

Dependable Bargains TOOL ROOM MACHY

Hendey Lathes 12x5; 14x6; 16x8
Lodge & Shipley & American Lathes from 14x6 to 36x20
B&S Millers,
#2YB, #2B, #2B Heavy Plain
#1A, #2A Universal
#2 & 3 Vertical
Shapers; American, G&E, Cin. 16" to 28"
Radial Drills 3' to 5'
Grinders: B&S & Blanchard
Keller E5 Engraver
Norton Grinder 16"x50"
Boring Mills, 36" **Bullard,** 51" **Bausch,** 60" **Cin.**
Lucas 15-ton **Forcing Press**

Every Machine Guaranteed

Will pay cash for your surplus machines.

HASCO, INC.
Herbert Action Segal, Mgr.
38 CLINTON ST., NEWARK, N. J.

A Selection from our Stock of 3000 Machines

Boring Mill—Bullard 36" New Era, M.D.
Boring Mill—Bullard 36" Rapid Prod.
Boring Mill—Bement 3½" Bar Horiz.
Drills—Cin.-Bick. 2½" M.D. Radial.
Drills—Allen 3 and 4 sp. BB.
Gear Shapers—Fellows No. 7, No. 75.
Grinders—Brown & Sharpe No. 2, No. 3 Univ.
Lathe—Lodge & Shipley 16"x6' M.D.
Lathe—Hendey 20"x14' GH. M.D.
Lathe—American 30"x12' GH. M.D.
Millers—Milwaukee No. 2B, No. 4B Double Overarm Plain.
Screw Machines—Brown & Sharpe No. 4 Auto. arr. for M.D. (3).

BOTWINIK BROS., INC.
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82"x1" Cap. **L. & A. Gate Shear.**
No. 13 **B&S Univ. Tool Grinder.**
No. 2 **B&S Surface Grinder.**
No. 2 & 3 **W. & M. Surface Grinder.**
No. 3 **DIAMOND Surface Grinder.**
No. 2 **CINTI: Univ. Miller** BD
No. 2A **B&S Univ. Miller** SPD
No. 2B **B&S Plain Miller** SPD.
No. 1½ **ROCKFORD Pl. Miller** BD.
14x6' **HENDY Lathe Tie Bar.**
15" **P&J tool room shaper.**
3' **BICKFORD Radial drill** SPD.
42" **GISHOLT Vert. Boring Mill.**

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IMMEDIATE SHIPMENT

Air Compressor, No. 18 North American, 16 Oz. 2400 C.F.M.
Cut Off Machine, No 5½ Nutter Barnes
Drill, Bausch Multiple, 8 Spdle, #2 Taper
Gear Hobber, No. 12 Barber Coleman
Grinder, No. 2 Cincinnati, Cylindrical
Levelling Roll, 11 Roll Yoder
Mill, No. 4 Cincinnati, Plain, Cone Drive
Mill, No. 45 Bilton Producto-Matic
Mill, Gooley & Edlund Type A, Production
Mill, Vertical, No. 6 Becker
Mill, Vertical Model 8D Becker
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Welder, Federal Projection, 100 K.V.A.

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1—**Blanchard No. 16 Grinder** with 20 H.P. A.C. 550 v. 3 phase 60 cycle motor in spindle.
1—**Cincinnati-Bickford** 4 ft. **Radial Drill** arranged for motor drive.

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1—26"—19' bed **American Lathe**
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1—#90 **Fairbanks Power Hack Saw**
1—20' bed 13' **Platten Am. Tool Planer**
1—**Boring Mill, Barrett Horiz.** double spdl. 4" and 3" Boring Bars 52x80" table
1—#3 **Barrett Horizontal Boring Mill** 3½x84" table

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VAR. SPEED MOTORS

Duquesne Electric & Mfg. Company
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All Sizes of Rebuilt Machines. Brown & Sharpe, Gridley, Cleveland, Cone and Davenport.

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ENGINE LATHE

72" x 40'

PUTNAM — MOTOR DRIVE
12 SPEED GEARED HEAD

26" x 120" LANDIS GRINDER

Self Contained—Motor Drive

ROSENKRANZ, WEISBECKER & CO., Inc.
2309-B SINGER BLDG., N. Y. C.

CINCINNATI PLANER

72" x 72" x 12'

3 Heads—Rapid Traverse—Box Table
Self Contained Motor Drive—Late Type

O'BRIEN

OF PHILADELPHIA

AIR COMPRESSOR—9" x 8" Ingersoll Rand
BORING MILL—24" Bullard, Side Head
DRILLING MACHINES — 3 spdl. Allen, BB., #2 Taper
GRINDER — #3 Diamond, Surface, Cap. 12"x48"
GEAR CUTTERS—18" & 24" Gould Eberhardt Hobbers
LATHES — 36"x16' Putnam, Q.C.
TURRETS—#3A Warner & Swasey, Chuck. Equipt. #1 Brown & Sharpe, wire feed, equip.
PIPE MACHINES—2, 4, 6, 10", various makes, belt and motor drive.
MILLERS—#3 Kempsmith, plain, table 45"x10"; range 28"x9"x19". #3 Cincinnati vertical, table 56"x13½", range 34"x13" x14".
SHAPER—24" Columbia, mtr. dr.
TAPPERS—6 spdl. Anderson, mtr. dr.

THE O'BRIEN MACHINERY CO.

CABLE ADDRESS OBRIEN PHILA
113 N. THIRD ST., PHILADELPHIA, PA.
TELEPHONE MARKET 0727

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all types of metal working equipment

SEND US YOUR LISTS

Large stock of used reconditioned Machine Tools including Boring Mills, Shapers, Grinders, Radial Drills, Drill Presses, Turret Lathes, Shears, Gear Cutters, Pipe Machines, Power Presses, Lathes, Milling Machines, Screw Machines, etc.

1907 **JOSEPH BEAL & CO.** **1938**

465 ATLANTIC AVE., BOSTON, MASS.

Machine Tools in Stock

3-A WARNER & SWASEY Turret Lathe with Chucking Equipment.

48" BULLARD Vertical Boring Mill, 2 Service Heads, Self-Contained Motor Drive.

3' MUELLER Radial Drill, Single Pulley Drive.

10' ⅜" LOY & NAWRATH Shear.

4-Spindle HENRY-WRIGHT Drill Press.

No. 11 TOM THUMB 1¼" Cap. Pipe Threading Machine.

6'—10 Ga. DREIS & KRUMP Press Brake.

WEHRHEIM MACHINERY CO.

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ALL SIZES

ALL TYPES

We have in stock ready for immediate shipment approximately 100 REBUILT Hanna Rapid or Production Riveters, suitable for high speed riveting. Sizes 3 to 20 tonnage capacity, good for 1/16" to 5/8" rivets. We have these riveters in various styles and sizes. *Full information and prices upon request.*

LOUIS E. EMERMAN & CO.

1763 Elston Ave. **CHICAGO**

"READY TO SHIP"

1—No. 16 BLANCHARD Grinder, 26" chuck, belt drive.
1—NORTON Cylindrical Grinder, 5"x18", self contained, S.P.D.
3—BROWN & SHARPE No. 2 Y.B. Plain Millers, motor in base, 440V., 3 ph., 60 cycle.
1—SHUSTER Wire Straightener, ⅜"x10' capacity.
1—BROWN & SHARPE Plain Miller, No. 3B Heavy S.P.D.
1—CINCINNATI No. 4 Plain Miller, dividing and vertical heads, C.D., Q.C. feeds.
1—CINCINNATI #3 Plain Miller, high power, large pulley all feeds S.P.D.
1—LODGE & SHIPLEY 48"x18' Screw Cutting Lathe, triple geared face plate, cone driven.
1—PRATT & WHITNEY Threadmiller 4½x12.
4—PORTER Cable 9"x36" Mfg. Lathes SPD.
1—16" CINCINNATI Gear Hobber, SPD.
4—No. 4 WARNER & SWASEY Turrets, Wire Feed.
1—CINCINNATI-BICKFORD 6' Radial Drill, A.C. M.D. thru gear box.
1—REED PRENTICE 5' Radial, M.D.
1—PRATT & WHITNEY No. 13 Multiple Spindle Drill Press, rec. hd.
1—GOULD & EBERHARDT 24" C.D. Crank Shaper.
1—60"x48"x12' NILES BEMENT POND Planer, 2 Heads, 1 Side Head, Belt or Motor.
10—No. 18S BLISS Bench Presses, Roller Clutches.
1—15 Ton LUCAS Power Forcing Press.

Other just as desirable tools in our large stock. Your Inquiries requested.

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BARGAINS

1—1-B **K & T. Pl. Milling Machine;** Dbl. overarm; A.C.M. Dr.
1—36"x32"x14' **Cincinnati Planer;** 2 heads.
1—16"x8' **Whitcomb-Blaisdell** G. Hd. **Lathe;** New.
1—14" **Pratt & Whitney Surface Grinder,** motor driven.
1—175-A **Consolidated Dbl. Crank Press** 42" Bet. Uprights with 10" Gap. **O.B.I.** with A.C. Motor Dr.

Stock Includes 300 Other Machine Tools

THE NORTON-BROADWAY MACHINERY CO.

610 Baymiller St., Cincinnati, Ohio

DOUBLE CRANK PRESS

95 E Toledo Double Crank Press, Tie rod construction. Bed F to B and R to L, 60"x84". Crankshaft 7½ and 8" diameter. 14" stroke, friction clutch. Die space from bed to ram stroke down and adjustment up 37". Can be inspected in operation. Price on application. 500 other machines in stock. Send us your inquiries.

INTERNATIONAL MACHINERY CO.

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PRICE PERFORMANCE PROMPT DELIVERY!!

Ask For Complete Stock List

OVER 2000 MACHINES IN STOCK

AIR COMPRESSOR—10x10 Ingersoll Rand
BORING MILLS—Horiz. 4½" Bar Niles Bement Pond—Table type; Vertical—36" Bullard Rapid Traverse; 30" Rogers
BRAKES—8'¼"—10'3/16"—10'10 ga.—6'12—8-12 ga. **Also all sizes Hand Brakes**
CRANES—7½ Ton Shaw—50' span—stationary; 3 Ton Northern Elec. Hoist
DRILLS—20" Self-Oiling Camel Back—M.D.; No. 2 Avey; Multiple—No. 16 Natco Motor Drive, 34 spindles, Index Table; No. 11 Natco—12 spindles; No. 12 Natco—9 spindles; 6 spindle Bausch; 18 spindle Root; Radial—5 Ft. Fosdick; 3 Ft. American
FURNACE—Elec. Furnace Co. 1550° Conveyor type Heat Treating Complete—Like New
GRINDERS—No. 25 Heald Rotary—Hydr. feed; 18" chuck; No. 24 Gardner 53" Horiz. Disc B.B.; No. 7 Gardner B.B. 30" Disc
HAMMERS—No. 4 Standard Drop—400#; Quickwork-Post 36" throat; 100# Bradley Helve
KEYSEATERS—No. 2 Davis; No. 2 Mitts & Merrill
LATHES—All Modern Quick Change Gear—36" x 30 Ft. and 30"x16 Ft. Lodge & Shipley—Taper Attach.; 48"x18 Ft. Schumacher & Boye; 26"x16 Ft. Bradford; 25x16 Ft. Ryerson—Geared Head—Built-in motor; 16"x8 Ft. Hendey; 20" x 10 Ft. American Geared Head; 26"x8 Ft. Am.; 18"x8 Ft. Monarch
SPINNING LATHES—Ball Bearing — Pryibil—Bliss—Toledo—All Sizes Over 40 in stock
TURRET LATHES—No. 4-A Warner & Swasey Universal—Over 208,000 serial number, Covered Ways LIKE NEW—W & S No. 1-A, No. 2-A, No. 4, No. 6 M.D.; No. 9 Bardons & Oliver—No. 8 Foster; 24" Gisholt
MILLERS—Ingersoll Planer Type—2 side heads; Nos. 1 & 3 Kempsmith; No. 3 B & S., No. 4 & 5 Cin.; No. 2-B B & S M.D.; No. 3-B K & T; No. 1-A Milwaukee; No. 1-A K & T Dble overarm; UNIV. No. 1½A, 2A B & S; No. 25 Ohio
NIBBLERS—No. 1, 1-B, 2 Campbell, No. 0, 00, 1 Gray
PLANER—Openside Detrich & Harvey 42"; 54" Gray
PUNCH & SHEAR UNIV.—Schatz 6x6; Smith 3x3
PRESS BRAKE—10'10 ga. Excellent condition
PRESSES DOUBLE CRANK—No. 6-A Bliss 48" betw., tie rod, 5" str; No. 615 Nia. 62" betw. 4" str.
PRESSES TOGGLE—No. 3½A 12" str.; No. 408-B Bliss 25" str. 84" betw. tie rod
ROLLS—10'½"; 14 Ft. 8" dia. Power Elev. M.D.; 10'3/16"
SAWS—High Speed 6"x6"; 9"x9"; 12"x12"
SHAPERS—16" & 24" G&E; 24" Ohio Dreadnaught; 20" Queen City
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ALLOYS, Low-Temperature Melting
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Cerro de Pasco Copper Corp., 44 Wall St., New York, N. Y.
Crucible Steel Co., of America, 405 Lexington Ave., New York, N. Y.

ALLOYS, Phosphor Bronze
American Brass Co., Waterbury, Conn.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Driver-Harris Co., Harrison, N. J.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

ALLOYS, Silico-Manganese
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.

ALLOYS, Silico-Managnese (Continued)
Colonial Steel Co., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.
American Manganese Steel Div., 389 E. 14th St., Chicago Heights, Ill.

ALLOYS, Steel
American Manganese Steel Div., 389 E. 14th St., Chicago Heights, Ill.
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colmonoy, Inc., P. O. Box 977, Los Nietos, Calif.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pitts., Pa.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Monarch Steel Co., Indianapolis, Ind.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.

ALLOYS, Steel (Continued)
Timken Steel & Tube Div., Timken Roller Bearing Co., Canton, Ohio
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.

ALLOYS, Steel, Cold Finished
Bliss & Laughlin Inc., Harvey, Ill. & Buffalo, N. Y.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Monarch Steel Co., Indianapolis, Ind.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Timken Steel & Tube Div. Timken Roller Bearing Co., Canton, Ohio.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

WHERE-TO-BUY DIRECTORY

ALLOYS, Tantalum
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Tungsten Carbide Tool Co., Detroit, Mich.
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.
Wesson Co., Detroit, Mich.

ALLOYS, Titanium
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Tungsten Carbide Tool Co., Detroit, Mich.
Wesson Co., Detroit, Mich.

ALLOYS, Tungsten
Anchor Drawn Steel Co., Pittsburgh, Pa.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Kokomo, Ind.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Tungsten Carbide Tool Co., Detroit, Mich.
Tungsten Electric Corp., New York City
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.
Wesson Co., Detroit, Mich.

ALLOYS, Vanadium
Anchor Drawn Steel Co., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.

ALLOYS, Zinc
New Jersey Zinc Co., 160 Front St., N. Y. C.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

ALUMINUM
Aluminum Co. of America, Pittsburgh, Pa.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

AMPLIFIERS
Cimatool Co., Dayton, Ohio
Mellaphone Corp., 65 Atlantic Ave., Rochester
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Raytheon Mfg. Co., 190 Willow St., Waltham, Mass.
Scherr Co., George, Inc., 128 Lafayette St., New York
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Van Keuren Co., 12 Copeland St., Watertown, Mass.

ANGLE BEVELERS & PLANERS
Thomas Machine Mfg. Co., Pittsburgh, Pa.

ANGLE PLATES
Cleveland Universal Jig Co., 13325 St. Clair Ave., Cleveland, Ohio
Knu-Vise Products Co. Inc., 6432 Cass Ave., Detroit, Mich.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Ouellet, A. F., 203 Lafayette St., N. Y. C.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Tafe-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Van Keuren Co., 12 Copeland St., Watertown, Mass.

ANGLES, Beams, Channels and Tees
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

ANGLES, Beams, Channels and Tees (Cont.)
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.

ANGLES, Beams, Channels and Tees, Aluminum
Aluminum Co. of America, Pittsburgh, Pa.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

ANNEALING, Baths
Holden Co., A. F., 200 Winchester Ave., New Haven, Conn.

ANODES, All Types
American Brass Co., Waterbury, Conn.
Baker & Co., Inc., 54 Austin St., Newark, N. J.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

ARBOR PRESSES (see Presses, Arbor)

ARBORS AND MANDRELS
Brown & Sharpe Mfg. Co., Providence, R. I.
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Cincinnati Milling Mach. Co., Cincinnati, O.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Cochrane-Bly Co., 15 St. James Pl., Rochester
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Illinois Tool Wks., 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Jacobs Mfg. Co., 2074 Park St., Hartford, Conn.
Kearney & Trecker Corp. Milwaukee.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
McCrosky Tool Corp., 1340-80 South Main St., Meadville, Pa.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Tool Co., Cleveland, O.
Production Tool Co., 6474 LeGrande Ave., Detroit, Mich.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Universal Engineering Co., Frankemuth, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Westcott Chuck Co., 401 E. Walnut St., Oneida, N. Y.
Western Tool & Mfg. Co., Springfield, Ohio

BABBITT
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Moccasin Bushing Co., Chattanooga, Tenn.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

BALANCING EQUIPMENT, Portable
Electrocon Corp., 6 Varick St., N. Y. C.

BALANCING MACHINES
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Globe Tool & Engineering Co., 420 Davis Ave., Dayton, Ohio
Norton Co., 1 New Bond St., Worcester, Mass.
Taylor Mfg. Corp., 2330 Clybourn St., Milwaukee, Wis.
Tinius Olsen Testing Machine Co., 500 N. 12th St., Philadelphia, Pa.

BALANCING TOOLS
Anderson Bros. Mfg. Co., Rockford, Ill.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Globe Tool & Engineering Co., 420 Davis Ave., Dayton, Ohio
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Tinius Olsen Testing Machine Co., 500 N. 12th St., Philadelphia, Pa.
Sundstrand Machine Tool Co., Rockford, Ill.
Taft-Pierce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

BALING PRESSES
Continental Machine Specialties, Inc., Minneapolis, Minn.
Francis Co., Chas. E., W. Fifth St., Rushville, Ind.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Watson-Stillman Co., Roselle, N. J.

BALL HEADERS, Hot and Cold
National Machinery Co., Tiffin, O.

BALLS, Brass, Bronze and Steel, Etc.
Atlas Ball Co., Glenwood Ave. & American St., Philadelphia, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Hartford Steel Ball Co., Hartford, Conn.
Hoover Steel Ball Co., Ann Arbor, Mich.
New Departure Div. General Motors Corp., Bristol, Conn.
Nice Ball Bearing Co., 30th and Nicetown Lane, Philadelphia, Pa.
Waterbury Steel Ball Co., Poughkeepsie, N. Y.

BALLS, Brinell, Cemented Carbide
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Firth Sterling Steel Co., McKeesport, Ba.

BALLS BURNISHING
Atlas Ball Co., Phila., Pa.

BARRELS, Fibre
Continental Diamond Fibre Co., Newark, Del.

BARRELS, Tumbling and Burnishing
American Foundry Equipment Co., Mishawaka, Ind.
Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., 1259 West 76th St., Cleveland, Ohio
Goodrich Company, B. F., Akron, O.
Hanson-VanWinkle-Munning Co., Matawan, N. J.
Hartford Steel Ball Co., Hartford, Conn.
Pangborn Corporation, Hagerstown, Md.
Ransohoff, Inc., Carthage, Cincinnati, Ohio
Royersford Fdry. & Mach. Co. Inc., Main St., Royersford, Pa.
Waterbury Steel Ball Co., Poughkeepsie, N. Y.

BARS, Alloy
Aluminum Co. of America, Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
International Nickel Co., Inc., 67 Wall St., New York, N. Y.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Republic Steel Corp., Republic Bldg., Cleveland
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Roller Bearing Co., Canton, O.
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.

BARS, Aluminum
Aluminum Co. of America, Pittsburgh, Pa.

BARS, Boring (see Boring Bars)

BARS, Brass, Bronze and Copper
American Brass Co., Waterbury, Conn.
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Moccasin Bushing Co., Chattanooga, Tenn.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

BARS, Cold Drawn
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bliss & Laughlin Inc., Harvey, Ill. and Buffalo, N. Y.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St. Latrobe, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Monarch Steel Co., Indianapolis, Ind.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Co., Massillon, Ohio
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.
Wyckoff Drawn Steel Co., Box 1256 First National Bank Bldg., Pittsburgh, Pa.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

BARS, Sine
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.
Van Keuren Co., 12 Copeland St., Watertown, Mass.

BARS, Steel
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Republic Steel Corp., Republic Bldg., Cleveland

WHERE-TO-BUY DIRECTORY

BARS, Steel (Continued)
Ryerson & Co., Inc., Jos. T. 16th and Rockwell Sts., Chicago, Ill.
Timken Roller Bearing Co., Canton, O.
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.

BATTERY CHARGERS
Baker-Raulang Co., 2164 W. 25th St., Cleveland
Cutler Hammer, Inc., 315 N. 12th St., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Raytheon Mfg. Co., 190 Willow St., Waltham, Mass.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh

BATTERIES, Storage, Elec. Industrial Truck and Locomotives
Electric Storage Battery Co., Allegheny Ave., and 19th St., Philadelphia, Pa.
Goodrich Company, B. F., Akron, O.
U S L Battery Corp., Niagara Falls, N. Y.

BATHS, Heat Treating & Annealing
Bellis Heat Treating Co., Branford, Conn.
Holden Co., A. F., 200 Winchester Ave., New Haven, Conn.

BEAMS (see Angles, Beams, Channels and Tees)
BEAMS, Aluminum (see Angles, Beams, Channels and Tees)

BEARING, Bluing
Dayton Rogers Co., Minneapolis, Minn.
Dykem Co., The, 2301 N. 11th St., St. Louis

BEARING SHIMS
Goodrich Company, B. F., Akron, O.
Laminated Shim Co., 21-14 44th Ave., Long Island City, N. Y.
National Motor Bearing Co., 1100 78th Ave., Oakland, Cal.

BEARINGS, Babbitt
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Dodge Mfg. Corp., 505 S. Union St., Mishawaka, Ind.
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Link Belt Co., 2410 W. 18th St., Chicago
Power Transmission Council, 74 State St., Boston, Mass.
Royersford Frdy. & Mach. Co. Inc., Main St., Royersford, Pa.

BEARINGS, Ball
Ahlberg Bearing Co., 3028 W. 47th St., Chicago, Ill.
Ball & Roller Bearing Co., Danbury, Conn.
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Bearings Co., of America 501 Harrisburg Ave. Lancaster, Pa.
Boston Gear Works Inc., North Quincy, Mass.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie
Hoover Steel Ball Co., Arm Arbor, Mich.
Marlin-Rockwell Corp., 402 Chandler St., Jamestown, N. Y.
New Departure Div. General Motors Corp., Bristol, Conn.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Power Transmission Council, 74 State St., Boston, Mass.
S. K. F. Industries, Inc., Philadelphia, Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
Standard Machinery Co., 1600 Elmwood Ave., Providence, R. I.
Torrington Co., The, Field St., Torrington, Conn.

BEARINGS, Bronze
Allan & Son, A., 601-609 Bergen St., Harrison, N. J.
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Carlyle Johnson Machine Co., 52 Main St., Manchester, Conn.
Dodge Mfg. Corp., 505 S. Union St., Mishawaka, Ind.
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Moccasin Bushing Co., Chattanooga, Tenn.
Power Transmission Council, 74 State St., Boston, Mass.

BEARINGS, Die Cast
Power Transmission Council, 74 State St., Boston, Mass.
Stewart Die Casting Corp., Chicago, Ill.

BEARINGS, Graphited
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio

BEARINGS, Lineshaft
Ahlberg Bearing Co., 3028 W. 47th St., Chicago, Ill.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Dodge Mfg. Corp., Mishawaka, Iad.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie
Hanson Clutch & Machinery Co., Tiffin, Ohio
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Marlin-Rockwell Corp., 402 Chandler St., Jamestown, N. Y.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Power Transmission Council, 74 State St., Boston, Mass.
Royersford Frdy. & Mach. Co. Inc., Main St., Royersford, Pa.

BEARINGS, Lineshaft (Continued)
S. K. F. Industries, Inc., Philadelphia, Pa.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.
Waterbury Steel Ball Co., Poughkeepsie, N. Y.

BEARINGS, Needle
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Trenton, N. J.
S. K. F. Industries, Inc., Philadelphia, Pa.
Torrington Co., The, Field St., Torrington, Conn.

BEARINGS, Oilless
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Carlyle Johnson Machine Co., 52 Main St., Manchester, Conn.
Continental Diamond Fibre Co., Newark, Del.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.
Power Transmission Council, 74 State St., Boston, Mass.

BEARINGS, Phenolic Laminated
Bakelite Corp., Bound Brook, N. J.
Continental Diamond Fibre Co., Newark, Del.
Fast Bearing Co., Hampden Ave. & 23rd St., Baltimore, Md.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Synthane Corp., Oaks, Pa.

BEARINGS Quill
Bantam Ball Bearing Co., 3702 W. Sample St. South Bend, Ind.
Dodge Mfg. Corp., Mishawaka, Ind.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Royersford Frdy. & Mach. Co. Inc., Main St., Royersford, Pa.
S. K. F. Industries, Inc., Philadelphia, Pa.
Torrington Co., The, Field St., Torrington, Conn.

BEARINGS, Roller
Ball & Roller Bearing Co., Danbury, Conn.
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Dodge Mfg. Corp., 505 S. Union St., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hoover Ball & Bearing Co., Ann Arbor, Mich.
Hyatt Bearings Div. General Motors Corp., Harrison, N. J.
Latrobe Electric Steel Co., 2626 Ligonier St., Latrobe, Pa.
McGill Mfg. Co., Valparaiso, Ind.
Mellaphone Corp., 65 Atlantic Ave., Rochester
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Power Transmission Council, 74 State St., Boston, Mass.
Roller Bearing Co. of America, Trenton, N. J.
Royersford Frdy. & Mach. Co. Inc., Main St., Royersford, Pa.
S. K. F. Industries, Inc., Philadelphia, Pa.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
Standard Machy. Co., 1600 Elmwood Ave., Providence, R. I.
Torrington Co., The, Field St., Torrington, Conn.

BEARINGS, Self-Aligning Ball
Ahlberg Bearing Co., 3028 W. 47th St., Chicago, Ill.
Ball & Roller Bearing Co., Danbury, Conn.
Dodge Mfg. Corp., 505 S. Union St., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co. Inc., Poughkeepsie, N. Y.
Hoover Ball & Bearing Co., Ann Arbor, Mich.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Royersford Frdy. & Mach. Co. Inc., Main St., Royersford, Pa.
S. K. F. Industries, Front St. and Erie Ave., Philadelphia, Pa.

BEARINGS, Self-Aligning Roller
Ball & Roller Bearing Co., Danbury, Conn.
Dodge Mfg. Corp., 505 S. Union St., Mishawaka, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Royersford Frdy. & Mach. Co. Inc., Main St., Royersford, Pa.
Shaefer Bearings Corp., 35 E. Wacker Drive. Chicago, Ill.
S. K. F. Industries, Inc., Front St. & Erie Ave., Phila, Pa.

BEARINGS, Self Sealed Ball
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
Harvill Inc. H. L., 2344 E. 38th St., Los Angeles, Calif.
Marlin-Rockwell Corp., 402 Chandler St., Jamestown, N. Y.
New Departure Div. General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Torrington Co., Torrington, Conn.

BEARINGS, Tapered Roller
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.

BEARINGS, Tapered Roller (Continued)
Dodge Mfg. Corp., 505 S. Union St., Mishawaka, Ind.
Hoover Ball & Bearing Co., Ann Arbor, Mich.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Timken Roller Bearing Co., Canton, Ohio

BEARINGS, Thrust
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Boston Gear Works Inc., North Quincy, Mass.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Dodge Mfg. Corp., 505 S. Union St., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hoover Ball & Bearing Co., Ann Arbor, Mich.
Marlin-Rockwell Corp., 402 Chandler St., Jamestown, N. Y.
New Departure Div. General Motors Corp., Bristol, Conn.
Nice Ball Bearing Co., 30th and Nicetown Lane, Philadelphia, Pa.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
S. K. F. Industries, Inc., Philadelphia, Pa.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
Timken Roller Bearing Co., Canton, Ohio
Torrington Co., The, Field St., Torrington, Conn.

BELT CEMENT, Dressing and Fillers
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Desmond-Stephan Mfg. Co., 317 S. Walnut St., Urbana, O.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Jos. Dixon Crucible Co., Jersey City, N. J.
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Houghton & Co., E. F., Philadelphia, Pa.
Power Transmission Council, 74 State St., Boston, Mass.
Rhoads & Sons, J. E., 35 North Sixth St., Philadelphia, Pa.

BELT FASTENERS, Lacing and Clamps
Armstrong-Bray & Co., 304 N. Loomis St., Chicago, Ill.
Birdsboro Steel Frdy. & Mach. Co., Birdsboro, Pa.
Bristol Co., Waterbury, Conn.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Dodge Mfg. Corp., 505 S. Union St., Mishawaka, Ind.
Flexible Steel Lacing Co., 4607 Lexington St., Chicago, Ill.
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Greene, Tweed & Co., 109 Duane St., New York, N. Y.
Power Transmission Council, 74 State St., Boston, Mass.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Rhoades & Sons, J. E., 35 North Sixth St., Philadelphia, Pa.
Shippert Mfg. Co., 414 S. Gelena Ave., Dixon, Ill.

BELT SCRAPERS
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Disston & Sons, Inc., Henry, Tacony, Phila.
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Power Transmission Council, 74 State St., Boston, Mass.
Rhoads & Sons, J. E., 35 North Sixth St., Philadelphia, Pa.

BELT SHIFTERS
Diamond Machine Co., Providence, R. I.
Dodge Mfg. Corp., 505 S. Union St., Mishawaka, Ind.
Power Transmission Council, 74 State St., Boston, Mass.
Ready Tool Co., Iranistan and Railroad Aves., Bridgeport, Conn.

BELT WAX
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Power Transmission Council, 74 State St., Boston, Mass.

BELTING CHAIN (see Chains, Transmission)

BELTING, Flat Fabric
Gilmer Co., L. H., Tacony, Philadelphia, Pa.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.
Wickwire Spencer Steel Co., New York City

BELTING, Leather
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Greene, Tweed & Co., 109 Duane St., N. Y. C.
Houghton & Co., E. F., Philadelphia, Pa.
Power Transmission Council, 74 State St., Boston, Mass.
Rhoads & Sons, J. E., 35 N. 6th St., Phila., Pa.

BELTING, Metal, Conveyor, High & Low Temperature
Wickwire Spencer Steel Co., New York City

BELTING, Rounded Leather
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Co., 356 Franklin St., Worcester, Mass.

WHERE-TO-BUY DIRECTORY

BELTING, Rounded Leather (Continued)
Greene, Tweed & Co., 109 Duane St., N. Y. C.
Houghton & Co., E. F., Philadelphia, Pa.
Rhoads & Sons, J. E., 35 N. 6th St., Phila., Pa.

BELTING, Rubber and Fabric
Dayton Rubber Mfg. Co., The, Dayton, Ohio
Gates Rubber Co., Denver, Colo.
Gilmer Co., L. H., Tacony, Philadelphia, Pa.
B. F. Goodrich Co., 576 South Main St., Akron, Ohio
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.
New York Belting & Packing Co., Market St., Passaic, N. J.
Power Transmission Council, 74 State St., Boston, Mass.
Republic Rubber Co., Youngstown, Ohio

BELTING, V,
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Dayton Rubber Mfg. Co., The, Dayton, Ohio
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., Denver, Colo.
Gilmer Co., L. H. Tacony, Philadelphia, Pa.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.
New York Belting & Packing Co., Market St., Passaic, N. J.
Republic Rubber Co., Youngstown, Ohio
Rhoads & Sons, J. E., 35 N. Sixth St., Phila.

BENCH CENTERS
Barber-Colman Co., 1200 River St., Rockford, Ill.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Sundstrand Machine Tool Co., Rockford, Ill.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

BENCH PLATES
A. B. C. Products, 11952 Montana Ave., West Los Angeles, Calif.
Baumbach Mfg. Co., E. A., 1812 S. Kilbourn Ave., Chicago, Ill.
Knu-Vise Products Co., Inc., 6432 Cass Ave., Detroit, Mich.
Taft-Peirce Mfg. Co., Woonsocket, R. I.

BENCHES AND BENCH LEGS
Baumbach Mfg. Co., E. A., 1812 S. Kilbourn Ave., Chicago, Ill.
Boice Crane Co., Toledo, Ohio
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Hardinge Brothers, Inc., Elmira, N. Y.
Pollard Bros. Mfg. Co., 4444 N. Knox Ave., Chicago, Ill.
Rivett Lathe & Grinder Inc., Brighton, Boston
Standard Pressed Steel Co., Jenkintown, Pa.
Western Tool & Mfg. Co., Springfield, Ohio
Whitney Metal Tool Co., Rockford, Ill.

BENDING AND STRAIGHTENING MACHINES
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Bertsch & Co., Cambridge City, Ind.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss Co., E. W., 53rd St. and 2nd Ave., Bklyn, N. Y.
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Punch & Shear Works, 3917 St. Clair Ave., Cleveland, O.
Consolidated Machine Tool Corp., Rochester
Elmes Engineering Works, Chas. F., 1001 Fulton St., Chicago, Ill.
Excelsior Tool & Machine Co., East St. Louis, Ill.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
General Mfg. Co., 6436 Fransworth Ave., Detroit, Mich.
Hendley & Whittemore Co., 10 S. State St., Beloit, Wis.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Keckley Co., O. C., 567 Washington Blvd., Chicago, Ill.
Lake Erie Engrg. Corp., Kenmore Sta., Buffalo, N. Y.
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Rock River Machine Co., Janesville, Wis.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Schuyler, W. A., 250 W. 57th St., N. Y. C.
United Engry. & Fdry. Co., Pittsburgh, Pa.
Wallace Supplies Mfg. Co., 1310 Diversey Pkway, Chicago, Ill.
Watson-Stillman Co., New York, N. Y.
Wickes Bros., 512 No. Water St., Saginaw, Mich.
Williams, White & Co., Moline, Ill.
Wood Company R. D., Philadelphia, Pa.

BENDING METAL, Low Temperature Melting
Cerro de Pasco Copper Corp., 44 Wall St., N. Y. C.

BENDING Rolls, Angle
Thomas Machine Mfg. Co., Pittsburgh, Pa.

BERYLLIUM
Beryllium Corp. of Pennsylvania, Reading, Pa.

BINS
Berger Mfg. Co. (Sub. of Republic Steel Corp.), Canton, Ohio
Frick-Gallagher Mfg. Co., Wellston, O.
General Fireproofing Co., Youngstown, Ohio
Koven & Bros. Inc., Jersey City, N. J.

Bins (Continued)
Lyon Metal Products Co., Aurora, Ill.
*Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Philadelphia, Pa.

BITS, Machine (see Tool Bits)

BLOCKS ANGLE
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Taft-Peirce Mfg. Co., Woonsocket, R. I.

BLOCKS, Die
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Jessop Steel Co., Washington, Pa.

BLOCKS, Chain (see Hoists, Chain)

BLOCKS, Pillow (see Pillow Blocks)

BLOCKS, Precision Gage
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scherr Co., Inc., George, 128 Lafayette St., N. Y. C.
Taft-Pierce Mfg. Co., Woonsocket, R. I.
Van Keuren Co., The, 12 Copeland St., Watertown, Mass.

BLOW PIPES, Gas-Cutting
Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
American Swiss File & Tool Co., Elizabeth, N. J.
Linde Air Products Co., Inc., 30 E. 42nd St., N. Y.

BLOW PIPES, Hand and Stand
American Gas Furnace Co., Elizabeth, N. J.
Linde Air Products Co., 30 E. 42nd St., N. Y. C.

BLOW TORCHES
Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
American Gas Furnace Co., Elizabeth, N. J.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Disston & Sons, Inc., Henry, Tacony, Phila, Pa.
Linde Air Products Co., Inc., 30 E. 42nd St., N. Y.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

BLOWERS AND FANS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Gas Furnace Co., Elizabeth, N. J.
American Mach. & Metals Inc., 100 Sixth Ave., N. Y. C.
Bendix Products Corp., South Bend, Ind.
Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill.
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Continental Diamond Fibre Co., Newark, Del.
DeLaval Steam Turbine Co., Trenton, N. J.
DeVilbiss Company, 300 Phillips Ave., Toledo, O.
Diehl Mfg. Co., Elizabethport, N. J.
Eclipse Fuel Engrg. Co., 701 S. Main St., Rockford, Ill.
Emerson Electric Mfg. Co., 2001 Washington Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Janette Mfg. Co., 536 W. Monroe St., Chicago
North American Mfg. Co., 2010 E. 75th St., Cleveland, Ohio.
Pangborn Corporation, Hagerstown, Md.
Signal Electric Mfg. Co., Menominee, Mich.
Spencer Turbine Co., Hartford, Conn.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Strong, Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio
Wagner Electric Corp., 6444 Plymouth Ave., St. Louis, Mo.
Wing, L. J. Mfg. Co., 154 W. 14 St., N. Y. C.

BLOWERS, Electric, Hand
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill.
Speedway Mfg. Co., 1834 S. 52nd Ave., Cicero, Ill.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio

BLUEPRINTING EQUIPMENT
Ozalid Corporation, 354 Fourth Ave., N. Y. C.
Paragon Revolute Corp., 77 South Ave., Rochester, N. Y.
Pease Co., C. F., 862 N. Franklin St., Chicago, Ill.
Shaw Blue Print Mach. Co., Inc., 9-11 Campbell St., Newark, N. J.
Wade Instrument Co., 2246 Brooklyn Station, Cleveland, Ohio
Wickes Bros., 512 N. Water St., Saginaw, Mich.

BLUEPRINTING MACHINES
Bruning Co., Inc., Chas., 102 Reade St., N. Y. C.
Paragon Revolute Corp., 77 South Ave., Rochester, N. Y.
Pease Co., C. F., 862 N. Franklin St., Chicago, Ill.
Shaw Blue Print Mach. Co., Inc., 9-11 Campbell St., Newark, N. J.
Wickes Bros., 512 N. Water St., Saginaw, Mich.

BLUING FOR STEEL
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Dykem Co., The, 2301 N. Eleventh St., St. Louis, Mo.

BLUING, Layout
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Dykem Co., The, 2301 N. Eleventh St., St. Louis, Mo.

BOLT AND NUT MACHINERY
Acme Machinery Co., 4533 St. Clair Ave., Cleveland, Ohio
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
Automatic Machine Co., Bridgeport, Conn.
Cleveland Automatic Mach. Co., Ashland Rd., Cleveland, O.
Cone Automatic Machine Co., Windsor, Vt.
Eastern Machine Screw Corp., 20-40 Barclay St., New Haven, Conn.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Landis Machine Co., Inc., Church and 5th Sts., Waynesboro, Pa.
Manville Co., E. J., Waterbury, Conn.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
National Acme Co., Cleveland, Ohio
National Machinery Co., Greenfield St., Tiffin, Ohio
New Britain-Gridley Machine Co., 140 Chestnut St., New Britain, Conn.
Pawtucket Mfg. Co., Pawtucket, R. I.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

BOLT HEADING AND FORGING MACHINES
Acme Machinery Co., 4533 St. Clair Ave., N. E., Cleveland, Ohio
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
National Machinery Co., Tiffin, Ohio
Pawtucket Mfg. Co., Pawtucket, R. I.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

BOLTS AND NUTS
Aluminum Co. of America, Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dardelet Threadlock Corp., 120 Broadway, New York
Driver-Harris Co., Harrison, N. J.
Parker-Kalon Corp., 200 Varick St., N. Y. C.
Pawtucket Mfg. Co., Pawtucket, R. I.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
S. K. F. Industries, Inc., Front St. & Erie Ave., Phila, Pa.
Williams & Co., Inc., J. H., 75 Spring St., N. Y. C.

BOLTS AND NUTS, T Slot
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.

BOLT CUTTERS
Buhr Machine Tool Co., Ann Arbor, Mich.

BOLT TRIMMERS
Bliss Co., E. W., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Manville Co., E. J., Waterbury, Conn.
National Machinery Co., Tiffin, O.
Waterbury Farrel Foundry & Mach. Co., Waterbury, Conn.

BOOKS, Technical
McGraw Hill Book Co., Inc., New York
New Method Engineering Corp., Chicago, Ill.

BORING BARS AND HEADS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago Ill.
Barber-Colman Co., 1200 River St., Rockford, Ill.
City Machine & Tool Works, E. 3rd at June, Dayton, Ohio
Craley Mfg. Co., C. C., P. O. Box 192, Schillington, Pa.
Davis Boring Tool Co. (Div. Larkin Packer Co.) 6200 Maple Ave., St. Louis, Mo.
Defiance Machine Works, Defiance, O.
Elmes Engineering Works, Chas. F., 1001 Fulton St., Chicago, Ill.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Gairing Tool Co., 1629 Lafayette Blvd., Detroit
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Ingersoll Milling Mach. Co., Rockford, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
E. Karelsen, Inc., 17 W. 44th St., N. Y. C.
Kelly Reamer Co., 3775 Ridge Rd., Cleveland
Lucas Machine Tool Co., 523 E. 99th St., Cleveland, Ohio
McCrosky Tool Corp., 1340-80 S. Main St., Meadville, Pa.
Michigan Tool Co., Detroit, Mich.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
National Twist Drill & Tool Co., Detroit, Mich.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Rickert-Shafer Co., 613 W. 11th St., Erie, Pa.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Universal Boring Machine Co., 312 Main St., Hudson, Mass.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Wesson Co., Detroit, Mich.
Westcott Chuck Co., 401 E. Walnut St., Oneida, N. Y.
Western Tool & Mfg. Co., Springfield, Ohio

WHERE-TO-BUY DIRECTORY

BORING CHUCKS
Cimatool Co., E. 3rd and June, Dayton, Ohio

BORING, Drilling, and Milling Machines, Horizontal
Barnes Co., W. F. & John, Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Buhr Machine Tool Co., Ann Arbor, Mich.
Consolidated Machine Tool Corp., Rochester
Defiance Machine Works, Defiance, Ohio
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Giddings & Lewis Machine Tool Co., 142 Doty St., Fond du Lac, Wis.
Gray Company, G. A., 3611 Woodburn Ave., Cincinnati, Ohio
Hall Planetary Co., Fox St. & Abbottsford Ave., Philadelphia, Pa.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Lucas Machine Tool Co., 523 E. 99th St., Cleveland, Ohio
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Moline Tool Co., 102-20th St., Moline, Ill.
Morton Mfg. Co., Muskegon Heights, Mich.
National Automatic Tool Co., S. 7th and N. Sts., Richmond, Ind.
Niles Tool Works Co., Hamilton, Ohio
Ohio Machine Tool Co., Kenton, Ohio
Rockford Drilling Machine Co., Rockford, Ill.
Schuyler, W. A., 250 W. 57th St., New York
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.
Snyder Tool & Eng. Co., Detroit, Mich.
Universal Boring Machine Co., 312 Main St., Hudson, Mass.

BORING, Drilling, and Milling Machines, Vertical
Barnes Drill Co., 814 Chestnut St., Rockford, Ill.
Barnes Co., W. F. & John, Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Consolidated Machine Tool Corp., Rochester
Defiance Machine Works, Defiance, O.
Dresses Machine Tool Co., 3366 Beekman St., Cincinnati, Ohio
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
Giddings & Lewis Machine Tool Co., 142 Doty St., Fond du Lac, Wis.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Knight Machinery Co., W. B., 3920 W. Pine Blvd., St. Louis, Mo.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Moline Tool Co., 102-20th St. Moline, Ill.
National Automatic Tool Co., South 7th and N. Sts., Richmond, Ind.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Rockford Drilling Machine Co., Rockford, Ill.
Royersford Fdry. & Mach. Co. Inc., Main St., Royersford, Pa.
Triplex Machine Tool Co., 125 Barclay St., N. Y. C.

BORING AND TURNING MILLS, Vertical
Bullard Co., Canfield Ave., Bridgeport, Conn.
Cincinnati Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
Hall Planetary Co., Fox Street & Abbottsford Ave., Philadelphia, Pa.
King Machine Tool Co., Cincinnati, Ohio
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

BORING MACHINES, Car Journal
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
Norton Mfg. Co. Muskegon Heights, Mich.

BORING MACHINES, Car Wheels
Consolidated Machine Tool Corp., Rochester, N. Y., Betts Div.
Four-Grip Tool Co., 115 E. 17th St., Paterson, N. J.
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

BORING MACHINES, Cylinder
Baker Bros., Inc., Post St., Toledo, Ohio
Barnes Co., W. F. & John, Rockford, Ill.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bullard Co., Canfield Ave., Bridgeport, Conn.
Consolidated Machine Tool Corp., Rochester
Defiance Machine Works, Defiance, O.
Ex-Cell-O Aircraft and Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
General Machinery Corp. (Niles Tool Wks. Div.) 545 No. Third St., Hamilton, Ohio

Boring Machines, Cylinder (Continued)
Giddings & Lewis Mach. Tool Co., Fond du Lac, Wis.
Heald Machine Co., New Bond St., Worcester, Mass.
Ingersoll Milling Machine Co., Rockford, Ill.
Lempco Products Inc., Bunham Rd., Bedford, Ohio
Moline Tool Co., 102 Twentieth St., Moline, Ill.
National Automatic Tool Co., South 7th and N. Sts., Richmond, Ind.
Rockford Drilling Machine Co., Rockford, Ill.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.
Universal Boring Machine Co., 312 Main St., Hudson, Mass.
Van Norman Machine Tool Co., 160 Wilbraham, Springfield, Mass.

BORING MACHINES, Diamond and Carbide Tool
Automatic Machine Co., Bridgeport, Conn.
Barnes Co., W. F. & John, Rockford, Ill.
Cimatool Co., Dayton, Ohio
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.
Defiance Machine Works, Defiance, Ohio
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Giddings & Lewis Mach. Tool Co., Fond du Lac, Wis.
Goss & deLeeuw Machine Co., New Britain, Conn
Heald Machine Co., New Bond St., Worcester, Mass.
Ingersoll Milling Machine Co., Rockford, Ill.
Leland-Gifford Co., Worcester, Mass.
Lucas Machine Tool Co., 523 E. 99th St., Cleveland, Ohio
Moline Tool Co., 102 Twentieth St., Moline, Ill.
National Automatic Tool Co., South 7th and N. Sts., Richmond, Ind.
New Britain Gridley Mach. Div., The New Britain Mach. Co., New Britain, Conn.
Rockford Drilling Machine Co., Rockford, Ill.
Springfield Machine Tool Co., The, 631 W. Southern Ave., Springfield, Ohio
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wisconsin
Universal Boring Machine Co., Hudson, Mass.

BORING MACHINES, Jig
Baker Bros. Inc., Post St., Toledo, Ohio
Cleereman Machine Tool Co., Green Bay, Wis.
Cochrane-Bly Co., 15 St. James Pl., Rochester
Fosdick Machine Tool Co., Blue Rock & Apple Sts., Cincinnati, Ohio
Giddings & Lewis Mach. Tool Co., Fond du Lac, Wis.
Gray Co., The G. A., 3611 Woodburn Ave., Cincinnati, Ohio
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Knight Machinery Co., W. B., 3920 West Pine Blvd., St. Louis, Mo.
Lucas Machine Tool Co., 523 E. 99th St., Cleveland, Ohio
Marburg Brothers Inc., 90 West St., N. Y. C.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Triplex Machine Tool Corp., 125 Barclay St., N. Y. C.
Universal Boring Machine Co., 312 Main St., Hudson, Mass.

BORING MACHINES, Locomotive Drive Box
Bullard Co., Canfield Ave., Bridgeport, Conn.
Consolidated Mach. Tool Corp., Rochester, N. Y.
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
King Machine Tool Co., Cincinnati, Ohio
Schuyler, W. A., 250 W. 5th St., New York
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

BORING MACHINES, Precision (see also Boring Machines, Diamond and Carbide Tool)
Atlas Press Co., 1819 N. Pitcher St. Kalamazoo, Mich.
Automatic Machine Co., 113 E. Washington Ave., Bridgeport, Conn.
Barnes Co., W. F. & John, Rockford, Ill.
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Cimatool Co., Dayton, Ohio
Cochrane-Bly Co., 15 St. James St., Rochester
Defiance Machine Works, Defiance, O.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Giddings & Lewis Mach. Tool Co., Fond du Lac, Wis.
Heald Machine Co., New Bond St., Worcester, Mass.
Leland-Gifford Co., Worcester, Mass.
Lucas Machine Tool Co., 523 E. 99th St., Cleveland, Ohio
Moline Tool Co., 102 Twentieth St., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Rockford Drilling Machine Co., Rockford, Ill.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wis.
Universal Boring Machine Co., 312 Main St., Hudson, Mass.

BORING TOOLS
Apex Machine and Tool Co., Dayton, Ohio
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Davis Boring Tool Co., (Div. Larkin Packer Co.), 6200 Maple Ave., St. Louis, Mo.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.

BORING TOOLS (Continued)
Four-Grip Tool Co., 115 E. 17th St., Paterson, N. J.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Haynes Stellite Co., Kokomo, Ind.
Heald Machine Co., New Bond St., Worcester, Mass.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
F. A. Kershaw, Kent, Ohio
Kelly Reamer Co., 3775 Ridge Road, Cleveland, Ohio
Lucas Machine Tool Co., 523 East 99th St., Cleveland, Ohio
McCrosky Tool Corp., 1340-80 So. Main St., Meadville, Pa.
Michigan Tool Co., Detroit, Mich.
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, Ohio
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Ready Tool Co., Iranistan and Railroad Aves., Bridgeport, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Stoody Co., Whittier, Calif.
Super Tool Co., 605 Boyer Bldg., Detroit
Taft-Peirce Mfg. Co., 32 Mechanic Ave., Woonsocket, R. I.
Tungsten Carbide Tool Co., Detroit, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Wesson Co., Detroit, Mich.
Westcott Chuck Co., 1101 E. Walnut St., Oneida, N. Y.
Western Tool & Mfg. Co., Springfield, Ohio
Wheel Trueing Tool Co., Detroit, Mich.

BORING TOOLS, Cemented Carbide (see Tools, Cemented Carbide)

BORING TOOLS, Diamond (see Tools, Diamond)
American Manganese Steel Div., 389 E. 14th St., Chicago Heights, Ill.
Calorizing Co., Wilkensburg, Pa.
Driver-Harris Co., Harrison, N. J.
Eclipse Fuel Engrg. Co., 701 S. Main St., Rockford, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Strong, Carlisle & Hammond Co., Cleveland

BOXES, Annealing and Case Hardening
General Alloys Co., 367 W. First St., Boston, Mass.
Seamless Prod. Co., Inc., 113 W. 42nd St., N. Y. C.

BOXES, Fibre
Continental Diamond Fibre Co., Newark, Del.

BOXES, Tool
Geometric Tool Co., Blake and Valley Sts., New Haven, Conn.
Gerstner and Sons, H., 138 Columbia St., Dayton, O.
Seamless Prod. Co., Inc., 113 W. 42nd St., N. Y. C.

BOXES, Tote
General Fireproofing Co., Youngstown, Ohio
Lyon Metal Products Co., Aurora, Ill.
Powell Pressed Steel Co., Hubbard, Ohio
Seamless Prod. Co., Inc., 113 W. 42nd St., N. Y. C.

BRAKE LINING
Colts Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., Hartford, Conn.
Gates Rubber Co., Denver, Colo.
Johns-Manville, 22 E. 40th St., N. Y. C.
Wagner Electric Corp., 6444 Plymouth Ave., St. Louis, Mo.

BRAKE LINING, Phenol Resinoid Impregnation
Bakelite Corp., Bound Brook, N. J.
General Plastics, Inc., North Tonawanda, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.
Marshall Asbestos Co., Troy, N. Y.

BRAKES, Electric
Cutler Hammer, Inc., 315 N. 12th St., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio
General Electric Co., Schenectady, N. Y.
Goss & deLeeuw Machine Co., New Britain, Conn.
Stearns Magnetic Mfg. Co., Milwaukee, Wis.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

BRAKES, Magnetic
Cutler Hammer, Inc., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

BRAKES, Metal Forming
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works Co., East 40th St. Clair Ave., Cleveland, Ohio
Dreis & Krump Mfg. Co., 7406 Loomis Blvd. Chicago, Ill.
Max Ams Machine Co., Bridgeport, Conn.
Peck, Stow & Wilcox Co., Southington, Cons.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Service Machine Co., 752 Broadway, Elizabeth, N. J
Strippit Corp., 1559 Niagara St., Buffalo, N. Y.
Whitney Metal Tool Co., Rockford, Ill.

BRASS, Rod, etc.
American Brass Co., Waterbury, Conn.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

WHERE-TO-BUY DIRECTORY

BRASS, Rod, etc. (Continued)
Conklin Brass & Copper Co., Inc., T. E., 54 Lafayette St., N. Y. C.
Ryerson & Co., Inc., Jos T., 16th and Rockwell Sts., Chicago, Ill.

BRAZING EQUIPMENT
Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
E. C. Atkins & Co., 402 S. Illinois St., Indianapolis, Ind.
Disston & Sons, Inc., Henry, Tacony, Phila., Pa.
Firth-Stirling Steel Co., McKeesport, Pa.
Grob Bros., Grafton, Wis.
Linde Air Products Co., Inc., 30 E. 42nd St., N. Y. C.
Miac Products Co., 129 E. Woodland Ave., Fort Wayne, Ind.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Oliver Machinery Co., Grand Rapids, Mich.

BRICK, for FURNACES
Carborundum Co., Niagara Falls, N. Y.
Norton Co., 1 New Bond St., Worcester, Mass.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio

BROACH-SHARPENING MACHINES
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Thompson Grinder Co., The, 1534 West Main St., Springfield, Ohio

BROACHES
American Broach & Mach. Co., (Div. of Sundstrand Mach. Tool Co.), Ann Arbor, Mich.
Bullard Co., Canfield Ave., Bridgeport, Conn.
Colonial Broach Co., Detroit, Mich.
Connecticut Broach & Machine Co., New London, Conn.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
Gammons, Holman Co., 405 Main St., Manchester, Conn.
Haynes Stellite Co., Kokomo, Ind.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
National Broach & Mach. Co., 11455 Shoemaker Ave., Detroit, Mich.
National Tool Co., Cleveland, O.

BROACHES, Cemented Carbide (see Tools, Cemented, Carbide)

BROACHING MACHINES
American Broach & Mach. Co. (Div of Sundstrand Mach. Tool Co.), Ann Arbor, Mich.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Elmes Engineering Wks., Chas F., 1001 Fulton St., Chicago, Ill.
Flexo Machines, 816 W. Erie St., Chicago, Ill.
Foote-Burt Company, Cleveland, O.
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
General Mfg. Co., 6430 Farnsworth Ave., Detroit, Mich.
Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.

BRONZE
American Brass Co., Waterbury, Conn.
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Barrett-Cravens Co., 3251 W. 30th St., Chicago, Ill.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Conklin Brass & Copper Co., Inc., T. E., 54 Lafayette St., N. Y. C.
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

BRUSHES, Commutator
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

BUFFING MACHINES
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Dumore Co., The, 135 14th St., Racine, Wis.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Marathon Elec. Mfg. Corp., Wassau, Wis.
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio
Packer Machine Co., Meridan, Conn.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.

BUFFING MACHINES (Continued)
Strand Co., N. A., 5001 N. Lincoln St., Chicago, Ill.
Vonnegut Moulder Corp., 1819 Madison Ave., Indianapolis, Ind.

BULLDOZERS
Ajax Mfg. Co., Euclid Branch P. O., Cleveland
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Beatty Machine & Mfg. Co., Hammond, Ind.
Chambersburg Engineering Co., Chambersburg, Pa.
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, Ohio
Elmes Eng. Works, Chas. F., Chicago, Ill.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Keckley, O. C., 567 Washington Blvd., Chicago
Rock River Machine Co., Janesville, Wis.
Watson-Stillman Co., Roselle, N. J.
Williams, White & Co., Moline, Ill.
Wood Company, R. D., Phila. Pa.

BURNERS, Gas and Oil
American Gas Furnace Co., Elizabeth, N. J.
Hones, Charles A., Inc., 121 S. Rand Ave., Baldwin, N. Y.
North American Mfg. Co., 2910 E. 75th St., Cleveland, Ohio
Rockwell Co., W. S., 50 Church St., N. Y. C.
Starrett Co., The L. S., Crescent St., Athol, Mass.
Strong, Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio

BURNISHING COMPOUNDS
Oakite Products Co., 22 Thomas St., N. Y. C.

BURNISHING MACHINES
Cimatool Co., Dayton, Ohio
Consolidated Machine Tool Corp., Rochester
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Michigan Tool Co., Detroit, Mich.

BURRING MACHINES
Acme Machinery Co., St. Clair Ave., N. E., Cleveland, O.
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Consolidated Mach. Tool Corp., Rochester, N. Y.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
National Machinery Co., Tiffin, Ohio
Niagara Mach. & Tool Co., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.

BUSHINGS, Brass, Bronze, etc.
Allan & Son, A., 601-609 Bergen St., Harrison, N. J.
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Boston Gear Works, Inc., No. Quincy, Ill.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Haynes Stellite Co., Kokomo, Indiana
Carlyle Johnson Machine Co., 52 Main St., Manchester, Conn.
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Moccasin Bushing Co., Chattanooga, Tenn.

BUSHINGS, Drill and Jig
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Jig Bushing Co., Pontiac, Mich.
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
Universal Engineering Co., Frankenmuth, Mich.

BUSHINGS, Graphited
Bunting Brass && Bronze Co., 715 Spencer St., Toledo, Ohio
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.

BUTTONS, Locating
Brown & Sharpe Mfg. Co., Providence, R. I.
Starrett Co., The L. S., Crescent St., Athol, Mass.
Universal Engineering Co., Frankenmuth, Mich.

CABINETS, Steel
General Fireproofing Co., 380 E. Dennick Ave., Youngstown, Ohio

CABLE
Anaconda Wire & Cable Co., N. Y. C.

CALCULATORS, Speed
Foster Machine Co., 1100 Beasley Ave., Elkhart, Indiana

CALIPERS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Lufkin Rule Co., The, Saginaw, Michigan
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Randall & Stickney, Waltham, Mass.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Starrett Co., The L. S., Crescent St., Athol, Mass.

CALIPERS, Roll
Farrel-Birmingham Co., Inc., Ansonia, Conn.

CAM SHAFTS, Hollow Bored
American Hollow Boring Co., 19th and Raspberry Sts., Erie, Pa.

CAMS
Brown & Sharpe Mfg. Co., Providence, R. I.
City Machine and Tool Works, E. 3rd at June, Dayton, Ohio
Cross Gear & Machine Co., 3230 Bellevue, Detroit, Michigan

CAMS (Continued)
Hartford Special Machinery Co., 282 Homestead Ave., Hartford, Conn.
Heppenstall Co., 4620 Hatfield St., Pittsburgh, Pa.
Kux-Lohner Machine Co., 2145 Lexington St., Chicago, Ill.
Modern Collett & Mach. Co., Ecorse, Mich.
Rowbottom Machine Co., Waterbury, Conn.

CAMS, Hydraulic and Air Operated
Cimatool Co., E. 3rd and June, Dayton, Ohio

CAMS, Face Type
Kux-Lohner Machine Co., 2145 Lexington St., Chicago, Ill.
Massachusetts Gear & Tool Co., 25 Nashua St., Woburn, Mass.

CARBIDE ALLOYS
American Cutting Alloys, Inc., N. Y. C.
Anchor Drawn Steel Co., Pittsburgh, Pa.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit
Colonial Broach Co., Detroit, Mich.
Colonial Steel Co., Pittsburgh, Pa.
Detroit Tap & Tool Co., Detroit, Mich.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Firth-Stirling Steel Co., McKeesport, Pa.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Haynes Stellite Co., Kokomo, Indiana
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Tungsten Carbide Tool Co., Detroit, Mich.
Vascoloy Ramet Division of Vanadium Alloys Steel Co., No. Chicago, Ill.
Wesson Co., Detroit, Mich.

CARBIDE, Calcium
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
Linde Air Products Co., Inc., 30 E. 42nd St., N. Y.
National Carbide Corp., Lincoln Bldg., N. Y. C.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

CARBON DIOXIDE METERS
Brown Instrument Co., Phila., Pa.

CARBURIZERS
E. F. Houghton Co., 240 W. Somerset St., Philadelphia, Pa.

CARBURIZING BOXES
American Manganese Steel Div., 389 E. 14th St., Chicago Heights, Ill.
Driver-Harris Co., Harrison, N. J.
Electro-Alloys Co., Taylor St., Elyria, O.
Seamless Prod. Co., Inc., 113 W. 42nd St., N. Y. C.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio

CARBURIZING MACHINE
American Gas Furnace Co., Elizabeth, N. J.
Holden Co., A. F., 200 Winchester Ave., New Haven, Conn.
Houghton & Co., E. F., Philadelphia, Pa.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Rockwell Co., W. S., 50 Church St., N. Y. C.

CAR MOVERS
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.

CASE HARDENING (see Heat-Treating)

CASES, Drill
Frick-Gallagher Mfg. Co., Wellston, O.
Huot Mfg. Co., 128 East 10th St., St. Paul, Minn.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Union Twist Drill Co., Butterfield Division, Derby Line, Vt.

CASES, Tool
Frick-Gallagher Mfg. Co., Wellston, O.
Gerstner & Sons, H., 138 Columbia St., Dayton, Ohio
Lufkin Rule Co., Saginaw, Mich.

CAST RESINOIDS, Transparent and Opaque Translucent
Bakelite Corp., Bound Brook, N. J.

CASTERS, Ball Bearing
Boston Gear Works, Inc., North Quincy, Mass.

CASTINGS, Alloy
Aluminum Co. of America, Pittsburgh, Pa.
American Manganese Steel Div., 389 E. 14th St., Chicago Heights, Ill.
Beryllium Corp. of Pa., Reading, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Colmonoy, Inc., P. O. Box 997, Los Nietos, Calif.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Electro-Alloys Co., Taylor St., Elyria, O.
Erie Foundry Co., Erie, Penna.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
General Alloys Co., 367 W. 1st St., Boston, Mass.
Haynes Stellite Co., Kokomo, Indiana
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit, Mich.
Ideal Foundry & Machinery Co., Beaver Falls, Penna.
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.

WHERE-TO-BUY DIRECTORY

CASTINGS, Alloy (Continued)
Link-Belt Co., 2045 W. Huntington Park Ave., Phila.
Ludlum Steel Co., Watervliet, N. Y.
Meehanite Inst. of America, Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Taylor & Fenn Co., 94 Arch St., Hartford

CASTINGS, Aluminum
Aluminum Co. of America, Pittsburgh, Pa.
Buckeye Iron & Brass Works, Dayton, O.
Clarksville Foundry & Machine Works, Commerce & Sprong Sts., Clarksville, Tennessee
Ideal Foundry & Machy Co., Beaver Falls, Pa.
Keckley Co., O. C., 567 Washington Blvd., Chicago, Ill.
Murray Mfg. Co., D. J., Wausau, Wis.
Oliver Machinery Co., Grand Rapids, Mich.
Stewart Die Casting Corp., Chicago, Ill.
Union Drawn Steel Co., Massillon, Ohio

CASTINGS, Ball Bearing
All Steel Welded Truck Corp., Rockford, Ill.
Boston Gear Works, Inc., North Quincy, Mass.

CASTINGS, Brass, Bronze and Copper
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Beryllium Corp. of Pa., Reading, Pa.
Buckeye Iron & Brass Works, Dayton, O.
Bullard Company, Canfield Ave., Bridgeport
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Clarksville Fdry. & Mach. Wks., Commerce & Springs Sts., Clarksville, Tenn.
Ideal Foundry & Machinery Co., Beaver Falls, Pa.
Johnson Bronze Co., New Castle, Pa.
Keckley Co., O. C., 567 Washington Blvd., Chicago, Ill.
Moccasin Bushing Co., Chattanooga, Tenn.
Stewart Die Casting Corp., Chicago, Ill.
Union Drawn Steel Co., Massillon, Ohio

CASTINGS, Centrifugal
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Michigan Steel Casting Co., 1986 Gudin St., Detroit, Mich.
Wood Company, R. D., Phila., Pa.

CASTINGS, Die
Aluminum Co. of America, Pittsburgh, Penna.
American Brass Co., Waterbury, Conn.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Veeder-Root Incorporated, Hartford, Conn.

CASTINGS, Gray Iron
American Engineering Co., 2407 Aramingo Ave., Philadelphia, Pa.
Brown & Sharpe Mfg. Co., Prdvidence, R. I.
Bullard Company, Canfield Ave., Bridgeport
Chambersburg Engineering Co., Chambersburg, Penna.
Clarksville Fdry. & Mach. Wks., Commerce & Springs Sts., Clarksville, Tenn.
Covel Mfg. Co., Benton Harbor, Mich.
Erie Foundry Co., Erie, Pa.
Etna Machine Co., Toledo, Ohio
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Francis Co., Chas. E., W. Fifth St., Rushville, Ind.
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Gerdes and Co., Inc., 36 Church St., N. Y. C.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Greenlee Bros. & Co., Rockford, Ill.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Hendey Machine Co., 105 Windsor St., Hartford, Conn.
Ideal Foundry & Machinery Co., Beaver Falls, Pa.
Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.
Link-Belt Co., 220 S. Belmont Ave., Ind.
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Murray Mfg. Co., D. J., Wausau, Wis.
Oliver Machinery Co., Grand Rapids, Mich.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Royersford Fdry. & Machine Co. Inc., Main St., Royersfold, Pa.
Taylor & Fenn Co., The, 54 Arch St., Hartford, Conn.
Union Mfg. Co., New Britain, Conn.

CASTINGS, Iron and Semi Steel
Etna Machine Co., Toledo, O.

CASTINGS, Mechanite
Farrel-Birmingham Co., Ansonia, Conn.
Meechanite Inst. of America Pittsburgh, Pa.
Wood Company, R. D., Philadelphia, Pa.

CASTINGS, Permanent Mold
Aluminum Co. of America, Pittsburgh, Pa.

CASTINGS, Steel
Birdsboro Steel Frdy. & Mach. Co., Birdsboro, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Phila.
Etna Machine Co., Toledo, Ohio
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Link-Belt Co., 300 W. Pershing Rd., Chicago
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Michigan Steel Casting Co., 1986 Gudin St., Detroit, Mich.

CEMENT, Disk Wheel
Gardner Machine Co., Beloit, Wis.
Hanchett Mfg. Co., 906 North State St., Big Rapids, Mich.
Maas & Waldstein, Newark, N. J.
Prosser & Sons, Thos., 15 Gold St., N. Y. C.
Walls Sales Corp., 96 Warren St., N. Y. C.

CEMENT, Phenol Resinoid
Bakelite Corp., Red Bank, N. J.

CEMENT, Refractory
Botfield Refractories Co., Swanson & Clymer Sts., Phila., Pa.
Carborundum Co., Niagara Falls, N. Y.
Johns-Manville, 22 E. 40th St., N. Y. C.
Norton Company, 1 New Bond St., Worcester, Mass.
Quigley Co., Inc., 56 W. 45th St., N. Y. C.

CENTER REAMERS
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
S. W. Card Mfg. Co. (Div. Union Twist Drill), Mansfield, Mass.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., 6918 Central Ave., S. E., Cleveland, Ohio.
Union Twist Drill Co., Athol, Mass.

CENTERING MACHINES
Consolidated Mach. Tool Corp., Rochester, N. Y.
Garrison Machine Works, Inc., Dayton, Ohio
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Heller Machine Co., 114 Liberty St., N. Y. C.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Seneca Falls Machine Co., Seneca Falls, N. Y.
Sundstrand Machine Tool Co., Rockford, Ill.

CENTERS, Ball Bearing
Ready Tool Co., Iranistan and Railroad Aves., Bridgeport, Conn.

CENTERS, Grinder
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Ready Tool Co., Iranistan and Railroad Aves., Bridgeport, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Tungsten Carbide Tool Co., Detroit, Mich.

CENTERS, Indexing
Abrasive Machine Tool Co., East Providence, R. I.
Brown & Sharpe Mfg. Co., Providence, R. I.
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Knight Machinery Co., W. B., 3920 West Pine Blvd., St. Louis, Mo.
Tafe-Peirce Mfg. Co., Woonsocket, R. I.

CENTERS, Lathe
Bullard Company, Canfield Ave., Bridgeport, Conn.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.
Eclipse Counterbore Co., Detroit, Mich.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Gisholt Machine Co., Madison, Wis.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Haynes Stellite Co., Kokomo, Indiana
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Ready Tool Co., The, 550 Iranistan Ave., Bridgeport, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Standard Tool Co., The., 6918 Central Ave., Cleveland, Ohio
Super Tool Co., 356 E. Congress St., Detroit
Tungsten Carbide Tool Co., Detroit, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Wesson Co., Detroit, Mich.

CENTERS, Lathe and Grinder, Cemented Carbide
Carboloy Co., 2989 E. Jefferson Ave., Detroit
Firth-Sterling Steel Co., McKeesport, Pa.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Tungsten Carbide Tool Co., Detroit, Mich.

CENTERS, Planer and Miller
Brown & Sharpe Mfg. Co., Providence, R. I.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Wesson Co., Detroit, Mich.

CENTRIFUGAL MACHINERY
Barrett Co., Leon J., Worcester, Mass.

CENTRIFUGALS
DeLaval Separator Co., 165 Broadway, N. Y. C.

CHAIN BLOCKS (see Hoists)

CHAIN DRIVES
Bilgram Gear & Machine Works, 1235 Spring Garden St., Philadelphia, Pa.
Boston Gear Works, North Quincy, Mass.
Cullman Wheel Co., Chicago, Ill.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Grant Gear Works, Inc., 154 W. Second St., South Boston, Mass.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
Meisel Press Mfg. Co., Boston, Mass.
Morse Chain Co., thaca, N. Y.
Palmer-Bee Co., Westminster & G. T. R. R. Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.
Whitney Chain & Mfg Co., Hartford, Conn.

CHAINS, Conveyor
American Manganese Steel Div., 389 E. 14th St., Chicago Hghts, Ill.
Boston Gear Works Inc., North Quincy, Mass.
Cullman Wheel Co., Chicago, Ill.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Palmer-Bee Co., Westminster & G. T. R. R. Detroit, Mich.
Whitney Chain & Mfg. Co., Hartford, Conn.

CHAINS ROLLER
Boston Gear Works Inc., North Quincy, Mass.
Cullman Wheel Co., 1349 Altgeld St., Chicago
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
Palmer-Bee Co., Westminster & G. T. R. R. Detroit, Mich.

CHAINS, Transmission
Boston Gear Works Inc., North Quincy, Mass.
Cincinnati Gear Co., 1825 Reading Road, Cincinnati, Ohio
Cullman Wheel Co., Chicago, Ill.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Morse Chain Co., Ithaca, N. Y.
Philadelphia Gear Works, Philadelphia, Pa.
Whitney Chain & Mfg. Co., Hartford, Conn.

CHAIRS AND STOOLS (see Furniture, Machine Shop)

CHAMFERING MACHINES
Bilgram Gear & Machine Works, 1235 Spring Garden St., Philadelphia, Pa.
Cimatool Co., Dayton, Ohio
Consolidated Machine Tool Corp., Rochester
Cross Gear & Machine Co., 3250 Bellevue Detroit, Mich.
Grant Mfg. & Machine Co., 90 Stillman Ave., Bridgeport, Conn.
Lipe, Inc., W. C., 208 S. Geddes St., Syracuse
Murchey Machine & Tool Co., 961 Porter St., Detroit, Mich.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.

CHANNELS (see Angles, Beams, Channels and Tees)

CHARTS
Permochart Company, Koppers Bldg., Pittsburgh, Pa.

CHASERS (see Die Heads)

CHECKS, Metal, Time, and Tool
Noble & Westbrook Mfg. Co., 20 Westbrook St., East Hartford, Conn.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

CHESTS, Tool
Berger Mfg. Co. (Sub. of Republic Steel Corp.), Canton, Ohio
Gerstner & Sons, H., 138 Columbia St., Dayton, Ohio
Lufkin Rule Co., The, Saginaw, Mich.
Stanley Tools, New Britain, Conn.

CHIP SEPARATORS
DeLaval Separator Co., 165 Bway, N. Y. C.

CHISEL BLANKS
Cleveland Punch & Shear Works Co., E. 40th and St. Clair Ave., Cleveland, Ohio
Disston & Sons, Inc., Henry, Tacony, Phila.

CHISELS, Cold, File, Setters, Etc.
American Swiss File & Tool Co., 400 Trumbull St., Elizabeth, N. J.
Bonney Forge & Tool Works, Allentown, Pa.

CHROMIUM PLATING
Pratt & Whitney Div. Niles-Bennett-Pond Co., 436 Capitol Ave., Hartford, Conn.
United Chromium Inc., 51 E. 42nd St., N. Y. C.
Veeder-Root Inc., Hartford, Conn.
Vinco Tool Co., 7350 Central Ave., Detroit

CHUCK CYLINDERS, Air
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
Logansport Machine Inc., Logansport, Ind.
Potter & Johnston Machine Co., Pawtucket R. I.

WHERE-TO-BUY DIRECTORY

CHUCK CYLINDERS, Air (Continued)
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.

CHUCKING MACHINES
Baird Machine Co., Bridgeport, Conn.
Bullard Co., 286 Canfield Ave., Bridgeport, Conn.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cleveland Automatic Machine Co., Cleveland
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
George Gorton Machine Co., 1107 13th St., Racine, Wis.
Goss & deLeew Mach. Co., New Britain, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
National Acme Co., Cleveland, Ohio
New Britain-Gridley Mach. Div., New Britain Mach. Co., 140 Chestnut St., New Britain, Conn.
Potter & Johnston Machine Co., Pawtucket, R. I.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

CHUCKS, Automatic and Quick Changing
Consolidated Machine Tool Corp., Rochester, N. Y. (Modern Tool Works)
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
McCrosky Tool Corp., 1340-80 S. Main St., Meadville, Pa.
Potter & Johnston Machine Co., Pawtucket, R. I.
Procunier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

CHUCKS, Collet (see Collets)

CHUCKS, Diaphragm
Van Norman Machine Tool Co., 160 Wilbraham Ave., Springfield, Mass.

CHUCKS, Drill and Tap
Alco Tool Co., Bridgeport, Conn.
Apex Mach. & Tool Co., Dayton, Ohio
Buhr Machine Tool Co., Ann Arbor, Mich.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Ettco Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Jacobs Mfg. Co., 2074 Park St., Hartford.
Lee & Sons, K. O., Aberdeen, S. D.
McCrosky Tool Corp., 1340-80 S. Main St., Meadville, Pa.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Procunier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Skinner-Chuck Co., 344 Church St., New Britain, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Union Mfg. Co., New Britain, Conn.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Westcott Chuck Co., 401 E. Walnut St., Oneida, N. Y.

CHUCKS, Electric
Cushman Chuck Co., Hartford, Conn.
Goss & deLeeuw Machine Co., New Britain, Conn.
Potter & Johnson Machine Co., Pawtucket, R. I.
Union Mfg. Co., New Britain, Conn.
Warner & Swansey Co., 5701 Carnegie Ave., Cleveland, Ohio

CHUCKS, Full Floating
Apex Machine & Tool Co., Dayton, Ohio
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Modern Collet & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Universal Engineering Co., Frankenmuth, Mich.

CHUCKS, Helical Gear
Cimatool Company, Dayton, Ohio

CHUCKS, Hydraulic
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Logansport Machine Co., Logansport, Ind.
Potter & Johnson Machine Co., Pawtucket, R. I.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

CHUCKS, Lathe
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Boice Crane Co., Toledo, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cushman Chuck Co., Hartford, Conn.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.

CHUCKS, Lathe (Continued)
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Potter & Johnston Machine Co., Pawtucket, R. I.
Pratt & Whitney, Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rivett Lathe & Grinder Co., Inc., 20 River view Rd., Brighton, Boston, Mass.
Scherr Co., Geo., 128 Lafayette St., N. Y. C.
Sjogren Mfg. Co., Los Angeles, Calif.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Stark Tool Co., Waltham, Mass.
Steege Machinery Co., 14 So. Clinton St., Chicago, Ill.
Thomas Hoist Co., 20 S. Hoyne Ave., Chicago
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Union Mfg. Co., New Britain, Conn.
Westcott Chuck Co., 401 E. Walnut St., Oneida, N. Y.

CHUCKS, Magnetic
Abrasive Machine Tool Co., East Providence, R. I.
Arter Grinding Machine Co., 15 Sagamore Rd., Worcester, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., New Bond St., Worcester, Mass.
L. W. Chuck Co., Toledo, O.
Rite Electric Mfg. Co., New York City
Robbins Engrg. Co., Detroit, Mich.
Steege Machinery Co., 14 So. Clinton St., Chicago, Ill.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Walker Co., Inc., O. S. Worcester, Mass.

CHUCKS, Pneumatic
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Logansport Machine Inc., Logansport, Ind.
Potter & Johnson Machine Co., Pawtucket, R. I.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

CHUCKS, Ring Wheel
Abrasive Machine Tool Co., East Providence, R. I.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Gardner Machine Co., Beloit, Wis.
Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.

CHUCKS, Spring
Brown & Sharpe Mfg. Co., Providence, R. I.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Modern Collett & Machine Co., Ecorse, Detroit, Mich.
Morrison Machine Products Div., Elmira, N. Y.
Rivett Lathe & Grinder Inc., Brighton, Boston, Mass.

CHUCKS, Vertical Boring Mill
Bullard Co., Canfield Ave., Bridgeport, Conn.
Consolidated Machine Tool Corp., Rochester, N. Y.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
King Machine Tool Co., Cincinnati, Ohio
Union Mfg. Co., New Britain, Conn.
Universal Engineering Co., Frankenmuth, Mich.

CLAMPS, "C"
Armstrong Bros. Tool Co., 315 Francisco Ave., Chicago, Ill.
Bonney Forge & Tool Works, Allentown, Pa.
Williams & Co., J. H., 75 Spring St., N. Y. C.

CLAMPS, Machinists.
Armstrong Bros. Tool Co., 316 N. Francisco Ave., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Lufkin Rule Co., The, Saginaw, Mich.
Starrett Co., The, L. S., Crescent St., Athol, Mass.
Western Tool & Mfg. Co., Springfield, Ohio
Williams & Co., J. H., 75 Spring St., N. Y. C.

CLAMPS, Strap
Armstrong Bros. Tool Co., 316 N. Francisco Ave., Chicago, Ill.
Knu-Vise Products Co., Inc., 6432 Cass Ave., Detroit, Mich.
Williams & Co., J. H., 75 Spring St., N. Y. C.

CLEANERS, Compound
Bullard Co., Canfield Ave., Bridgeport, Conn.
Curran Corp., 114 Central St., Somerville, Mass.
Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich.
Houghton & Co., E. F., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Meaker Company, 1629 S. 55th Ave., Chicago
Oakite Products Co., 22 Thames St., N. Y. C.
Quigley Co, Inc., 56 W. 45th St., N. Y. C.

CLEANERS, File
Disston & Sons, Inc., Henry, Tacony, Phila.
Nicholson File Co., Providence, R. I.

CLEANERS, Portable Elec.
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.

CLEANING MACHINES, Metal
American Foundry Equipment Co., Mishawaka, Ind.
Colt's Patent Fire Arms Mfg. Co., Hartford
Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich.
Hobart Bros. Co., Troy, Ohio
Metalwash Machinery Co., Inc., 117 E. 24th St., N. Y. C.
Pangborn Corporation, Hagerstown, Md.
Ransohoff, Inc., N. Carthage, Cincinnati.
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.

CLEANING MACHINES, Metal Grinding
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Hobart Bros. Co., Troy, Ohio
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.

CLOTH, Wire
Ludlow-Saylor Wire Co., St. Louis, Mo.

CLUTCH SHAFTS, Hollow Bored
American Hollow Boring Co., 19th and Raspberry Sts., Erie, Pa.

CLUTCHES, Ball Bearing
Johnson Machine Co., Carlyle, Manchester, Conn.

CLUTCHES, Friction
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Dodge Mfg. Corp., Mishawaka, Ind.
Dreis & Krump Mfg. Co., 7406 Loomis Blvd., Chicago, Ill.
Fairbanks, Morse and Co., 900 S. Wabash Ave., Chicago, Ill.
Foote Bros. Gear & Mach. Corp., 5301 S. Western Blvd., Chicago, Ill.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Hilliard Corporation, 102 W. 4th Ave., Elmira, N. Y.
Johnson Machine Co., Carlyle, 52 Main St., Manchester, Conn.
Link Belt Co., 2410 W. 18 St., Chicago, Ill.
W. C. Lipe, Inc., 208 S. Geddes St., Syracuse, N. Y.
Morse Chain Co., Ithaca, N. Y.
National Machinery Co., Tiffin, O.
Power Transmission Council, 1 Atlantic St., Stamford, Conn.
Rockford Drilling Machine Co., Rockford, Ill.
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.
Twin Disc Clutch Co., 1324 Racine St., Racine, Wis.

CLUTCHES, Magnetic
Cutler Hammer, Inc., Milwaukee, Wis.
Dickson Automatic Clutch Co., 606 S. Hill St., Los Angeles, Cal.
Power Transmission Council, 1 Atlantic St., Stamford, Conn.
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

CLUTCHES, Sheave & Gear
Johnson Machine Co., Carlyle, Manchester, Conn.

COATING MACHINES, Centrifugal
Barrett Co., Leon J., Worcester, Mass.

COIL WINDING EQUIPMENT
Globe Tool & Engrg. Co., Dayton, Ohio
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Seifert, Inc., E. R., Syracuse, N. Y.

COLLARS, Safety
Dodge Mfg. Corp., Mishawaka, Ind.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Johnson Machine Co., Carlyle, 52 Main St., Manchester, Conn.
Link-Belt Co., 2410 W. 18 St., Chicago, Ill.
Royersford Fdry. & Mach. Co. Inc., Royersford, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Standard Pressed Steel Co., Jenkintown, Pa.

COLLARS, Spacing
Atkins & Co., E. C., 402 S. Illinois St., Indianapolis, Ind.
Boston Gear Works, Inc., North Quincy, Mass.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.

COLLETS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Mach. Co., Cincinnati, O.
Consolidated Machine Tool Corp., Rochester, N. Y. (Modern Tool Wks.)
Cushman Chuck Co., Hartford, Conn.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Hardinge Brothers, Inc., Elmira, N. Y.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Modern Collett & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
Morrison Machine Products Div., Elmira, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.

WHERE-TO-BUY DIRECTORY

COLLETS (Continued)
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Stark Tool Co., Waltham, Mass.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Universal Engineering Co., Frankenmuth, Mich.
Van Norman Machine Tool Co., Springfield, Mass.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

COLLETS, Drill
Apex Mach. & Tool Co., Dayton, Ohio
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Modern Collett & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Automatic Tool Co., South 7th and N Sts., Richmond, Ind.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Procunier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Tomkins-Johnson Co., The, 615 N Mechanic St., Jackson, Mich.
Union Twist Drill Co., Athol, Mass.
Universal Engineering Co., Frankenmuth, Mich.

COLLETS, Lathe and Milling Machine
Hardinge Brothers, Inc., Elmira, N. Y.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Modern Collett & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Stark Tool Co., Waltham, Mass.
Van Norman Machine Tool Co., Springfield, Mass.
Vinco Tool Co., 7350 Central Ave., Detroit
Wade Tool Co., 49 River St., Waltham, Mass.

COLLETS, Screw Machine
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Lathe & Tool Co. Oakley, Cincinnati, Ohio
Cleveland Automatic Machine Co., 2369 Ashland Rd., Cleveland, O.
Cone Automatic Machine Co., Windsor, Vt.
Davenport Machine Tool Co., 167 Ames St., Rochester, N. Y.
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Hardinge Brothers, Inc., Elmira, N. Y.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Modern Collett & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
Morrison Machine Products Div., Elmira, N. Y.
National Acme Co., 170 E. 131st St., Cleveland, Ohio
New Britain-Gridley Machine Co., 140 Chestnut St., New Britain, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.

COLUMN FACING MACHINES
Thomas Machine Mfg. Co., Pittsburgh, Pa.

COMPARATORS, Dial
Marburg Brothers, Inc., 90 West St., N. Y. C.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Scheer Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Sheffield Gage Corp., Dayton, Ohio
Starrett Co., The L. S., Crescent St., Athol, Mass.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Van Keuren Co., The, 12 Copeland St., Watertown, Mass

COMPARATORS, Dial, Electric
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio

COMPARATORS, Gear Tooth
Bausch & Lomb Optical Co., Rochester, N. Y.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Starrett Co., The, L. S., Crescent St., Athol, Mass.
Triplex Machine Tool Corp., 125 Barclay St., N. Y. C.

COMPARATORS, Screw Thread
Jones & Lamson Machine Co., Springfield, Vt.
Scherr Co., Inc., Geo., 128 Lafayette St., N.Y.C.
Starrett Co., The, L. S., Crescent St., Athol, Mass.
Triplex Machine Tool Corp., 125 Barclay St., N. Y. C.

COMPASSES, Beam
Bartusch, A. P., 775 Walnut St., Lockport, N. Y.

COMPOUNDS, Broaching and Lapping
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.

COMPOUNDS, Cutting Drill and Grinding
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Gulf Refining Co., Gulf Bldg. Pittsburgh, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Oakite Products Co., 22 Thames St., New York, N. Y.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Socony-Vacuum Oil Co., Inc., New York, N. Y.
Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.
Stuart Oil Co., D. A., 2727 S. Troy St., Chicago, Ill.
Tidewater Associated Oil Co., 17 Battery Place, N. Y.

COMPOUNDS, Drawing
Houghton & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.

COMPOUNDS, Insulating
Bakelite Corp., Bound Brook, N. J.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Socony-Vacuum Oil Co., Inc., 26 B'way, N. Y. C.

COUPOUNDS RESIN
Formica Insulation Co., Cincinnati
Quigely Co. Inc., 56 W. 45th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., New York, N. Y.

COMPOUNDS, Tempering and Case Hardening
Bellis Heat Treating Co., Branford, Conn.
Houghton & Co., E. F., Philadelphia, Pa.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio
Stuart Oil Co., D. A., 2727 S. Troy St., Chicago, Ill.

COMPOUNDS, Valve Grinding
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

COMPRESSORS, Air and Gas
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Binks Mfg. Co., 3114 Carroll Ave., Chicago
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Curtis Pneumatic Machinery Co., 1924 Kienlen Ave., St. Louis, Mo.
De Laval Steam Turbine Co., Trenton, N. J.
DeVilbiss Company, 300 Phillips Ave., Toledo, O.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Saylor Beall Mfg. Co., Detroit, Mich.
Schramm Inc., West Chester, Pa.
Spray Engineering Co., 114 Central St., Somerville, Mass.
Sullivan Machinery Co., Michigan City, Ind.
Wright Mfg. Div. of Amer. Chain Co. Inc., Bridgeport, Conn.

COMPRESSORS, Centrifugal
DeLaval Steam Turbine Co., Trenton, N. J.
General Electric Co., Schenectady, N. Y.

CONDUIT, Thinwall
Aluminum Co. of America, 2107 Gulf Bldg., Pittsburgh, Pa.
Steel & Tubes, Inc. (Sub. of Republic Steel Corp.), Cleveland, Ohio

CONTOUR PROJECTORS
Bausch & Lomb Optical Co., Rochester, N. Y.
Leitz, Inc., E., New York, N. Y.
Scherr Co., Inc., Geo., 128 Lafayette St., N. Y. C.

CONTRACT WORK
All Steel Welded Truck Corp., 1139 Railroad Ave., Rockford, Ill.
American Broach Machine Co., 415 W. Huron St., Ann Arbor, Mich.
Automatic Machine Company, Bridgeport, Conn.
American Machine & Fdry. Co., Brooklyn, N. Y.
Baker Bros., Inc., Post St., Toledo, Ohio
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bergram Mach. Engineering Co., New Britain, Conn.
Charles H. Besley & Co., 118-124 North Clinton St., Chicago, Ill.
Breckenridge Mach. Co., 23000 St. Clair Ave., Cleveland, O.
Breckner-Kropf Mach. Co., Muskegon Heights, Mich.
Brown & Sharpe Mfg. Co., Providence, R. I.
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Bullard Company, Canfield Ave., Bridgeport, Conn.
Cimatool Co., Dayton, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cleveland Universal Jig Co., 13325 St. Clair Ave., Cleveland, Ohio
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Colonial Broach Co., Detroit, Mich.
Columbia Machine Tool Co., 1798 Fairgrove Ave., Hamilton, Ohio
Connecticut Broach & Mach. Co., New London, Conn.
Consolidated Machine Tool Corp., Rochester.
Continental Machine Specialties, Inc., 1301 Washington Ave. S., Minneapolis, Minn.
Cross Gear & Mach. Co., 3250 Bellevue Ave., Detroit, Mich.
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Defiance Machine Works, Inc., Dayton, Ohio
Detroit Tap & Tool Co., Detroit, Mich.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.

CONTRACT WORK (Continued)
Eastern Machine Screw Corp., Truman and Barclay Sts., New Haven, Conn.
Elmes Engrg. Works, Chas. F., 1001 Fulton St., Chicago, Ill.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Ganschow Gear Co., 1007 W. Washington Blvd., Chicago, Ill.
Garrison Machine Works, Inc., Dayton, Ohio
General Machinery Corp., (Niles Tool Works Div.), 545 N. Third St., Hamilton, Ohio
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Globe Machine & Stamping Co., 1250 West 76th St., Cleveland, Ohio
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Greenlee Bros. & Co., Twelfth St. and Columbia Ave., Rockford, Ill.
Hack Machine Co., 440 N. Oakley Blvd., Chicago, Ill.
Hartford Special Machinery Co., 282 Homestead Ave., Hartford, Conn.
Hobbs Mfg. Co., Worcester, Mass.
Hoefer Mfg. Co., Inc., Freeport, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Keckley Co., O. C., 567 Washington Blvd., Chicago, Ill.
Kent-Owens Machine Co., Toledo, Ohio.
Knight Machinery Co., W. B. 3920 West Pine Blvd., St. Louis, Mo.
Knu-Vise Products Co., Inc., 6432 Cass Ave., Detroit, Mich.
Kux-Lohner Machine Co., 2145 Lexington St., Chicago, Ill.
Lake Erie Engrg. Corp., Kenmore Sta., Buffalo, N. Y.
Lempco Products Inc., Dunham Road, Bedford, Ohio
W. C. Lipe, Incorporated, 208 S. Geddes St., Syracuse, N. Y.
Littell Machine Co., F. J., 4127 Ravenswood Ave., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Michigan Tool Co., Detroit, Mich.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Acme Co., Cleveland, Ohio
National Broach Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Oliver Machinery Co., Grand Rapids, Mich.
Phoenix Ice Mach. Co., 2703 Church Ave., Cleveland, O.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Royersford Fdry. & Mach. Co. Inc., Royersford, Pa.
Sabin Machine Co., 6538 Carnegie Ave., Cleveland, O.
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Seamless Prod. Co., Inc., 113 W. 42nd St., N. Y. C.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Sheffield Gage Corp., Dayton, Ohio.
Snyder Tool & Eng. Co., Detroit, Mich.
Springfield Machine Tool Co., The, 631 West Southern Ave., Springfield, Ohio
Standard Pressed Steel Co., Jenkintown, Pa.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wis.
Sundstrand Machine Tool Co., Rockford, Ill.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Thomas Machine Mfg. Co., Pittsburgh, Pa.
Torrington Co., The, Field St. Torrington, Conn.
Universal Engrg. Co., Frankenmuth, Mich.
U. S. Tool Co., Inc., Ampere, N. J.
Verdin, Koppes, Verdin Co., 108 W. 2nd St., Cincinnati, Ohio
Vinco Tool Co., 7350 Central Ave., Detroit
Wade Tool Co., 49 River St., Waltham, Mass.
Waltham Machine Works, Waltham, Mass.
Watson-Stillman Co., Roselle, N. J.
Whitney Metal Tool Co., Rockford, Ill.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.

CONTROL SYSTEMS
Lindberg Engrg. Co., 221 N. Laflin St., Chicago,

CONTROL SYSTEMS, Automatic Furnace
American Gas Furnace Co., Elizabeth, N. J.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Partlow Corp., 2 Campion Road, New Hartford, N. Y.
Strong, Carlisle & Hammond Mach. Co., Cleveland, Ohio
Taglinbue Mfg. Co., C. J., Park & Nostrand Aves., Brooklyn, N. Y.
Wheelco Instruments Co., 1112 Milwaukee Ave., Chicago, Ill.

CONTROLLERS & STARTERS, Electric
American Schaeffer & Budenberg Div. Consolidated Ashcroft Hancock Co., Bridgeport, Conn.
Electric Switch Corp., Columbus, Ind.

CONTROLLERS AND STARTERS, Motor
Allen-Bradley Co., 1326 South Second St., Milwaukee, Wis.

WHERE-TO-BUY DIRECTORY

CONTROLLERS and STARTERS, Motor (Cont.)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Colt's Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., Hartford, Conn.
Cutler Hammer, Inc., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 East 79th St., Cleveland, Ohio
General Electric Co., Schenectady, N. Y.
Lincoln Electric Co., Cleveland, Ohio
Monitor Controller Co., Gay, Lombard & Frederick Sts., Baltimore, Md.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa.

CONTROLLERS, Temperature
American Gas Furnace Co., Elizabeth, N. J.
Automatic Temperature Control Co., 34 E. Logan St., Pittsburgh, Pa.
Bristol Co., Waterbury, Conn.
Brown Instrument Co. (A Div. of Minneapolis-Honeywell Reg. Co.), 4501 Wayne Ave., Philadelphia, Pa.
Consolidated Ashcroft Hancock Co., Inc., Bridgeport, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Illinois Testing Lab, Inc., 420 N. LaSalle St., Chicago, Ill.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Lindberg Engrg. Co., 221 N. Laflin St., Chicago
Partlow Corp., New Hartford, N. Y.
C. J. Tagliabue Mfg. Co., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor Instrument Co., Rochester, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford.
Thwing-Albert Instrument Co., 3337 Lancaster Ave., Philadelphia, Pa.
Wheelco Instruments Co., 1112 Milwaukee Ave., Chicago, Ill.

CONVERTERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Raytheon Mfg. Co., 190 Willow St., Waltham, Mass.

CONVEYOR BELTS, Rubber
Dayton Rubber Mfg. Co., Dayton, Ohio
Gates Rubber Co., Denver, Colo.
Goodrich Company, B. F., Akron, O.
Manhattan Rubber Mfg. Co. Div. of Raybestos-Manhattan Inc., Passaic, N. J.

CONVEYOR CHAINS (see Chains, Conveyor)

CONVEYOR BELTS, Steel Mesh
Acme Steel Co., 2840 Archer Ave., Chicago, Ill.

CONVEYORS
American Mono-Rail Co., 13113 Athens Ave., Cleveland, Ohio
Clark Equipment Co., Battle Creek, Mich.
Dodge Mfg. Corp., 505 S. Union St., Mishawaka, Ind.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago
Mathews Conveyor Co., Elwood City, Pa.
Palmer-Bee Co., Westminster & G.T.R.R., Detroit, Mich.
Standard Conveyor Co., 315 Second Ave., North St. Paul, Minn.
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

COPPER
American Brass Co., Waterbury, Conn.
Conklin Brass & Copper Co., Inc., T. E., 54 Lafayette St., N. Y. C.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

CORE OILS
E. F. Houghton Co., 240 W. Somerset St., Philadelphia, Pa.

CORE MACHINE
American Foundry Equipment Co., Mishawaka, Ind.
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio

COUNTERBORES
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Hall Planetary Co., Fox St. & Abbottsford Ave., Philadelphia, Pa.
Haynes Stellite Co., Kokomo, Ind.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Palmer-Bee Co., Westminster & G.T.R.R., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Tool Co., 6474 LeGrande Ave., Detroit, Mich.
Prosser & Sons, Thos., 15 Gold St., New York, N. Y.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Super Tool Co., 605 Boyer Bldg., Detroit
Tungsten Carbide Tool Co., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.
Wesson Co., Detroit, Mich.

COUNTERBORES, Cemented Carbide (see Tools, Cemented Carbide)

COUNTERSHAFTS
American Tool Works Co., Pearl & Eggleston Aves., Cincinnati, Ohio
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Hendey Machine Co., 105 Summer St., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Madison and Edwards Roads, Cincinnati, Ohio
Standard Pressed Steel Co., Jenkintown, Pa.
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.
Warner && Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

COUNTERSINKS
American Swiss File & Tool Co., Elizabeth, N. J.
Butterneld Div. (Union Twist Drill Co.) Derby Line, Vt.
Certified Flexible Couplings, Inc., 122 E. 42nd St., N. Y. City
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Tool Co., 6474 LeGrande Ave., Detroit, Mich.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Starrett Co., The L. S., Crescent St., Athol, Mass.
Super Tool Company, 356 E. Congress St. Detroit, Mich.
Tungsten Carbide Tool Co., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.
Wesson Co., Detroit, Mich.

COUNTERS and COUNTING MACHINES
Production Instrument Co., 1325 S. Wabash Ave., Chicago, Ill.
Veeder-Root Incorporated, Hartford, Conn.

COUNTERS, Revolution
Bristol Company, Waterbury, Conn.
Production Instrument Co., 1325 So. Wabash Ave., Chicago, Ill.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Starrett Co., The L. S., Crescent St., Athol, Mass.
Veeder-Root Incorporated, Hartford, Conn.

COUPLINGS, Flexible
Allis-Chalmers Mfg. Co., Milwaukee, Wisc.
Bartlett Hayward Div. Koppers Co., Baltimore
boston Gear Works, Inc., North Quincy, Mass.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Continental Diamond Fibre Co., Newark, Delaware
Cullman Wheel Co., Chicago, Ill.
DeLaval Steam Turbine Co., Trenton, N. J.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Foote Bros. Gear & Mach. Corp., 5301 S. Western Blvd., Chicago, Ill.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Harris Coupling Co., 265 W. 40th St., N. Y. C.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Lovejoy Flexible Coupling Co., 4956 W. Lake St., Chicago, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morse Chain Co., Ithaca, N. Y.
Nicholson & Co., W. H., 114 Oregon St., Wilkes-Barre, Pa.
Palmer-Bee Co., Westminster & G.T.R.R., Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.
Power Transmission Council, 74 State St., Boston, Mass.
Smith Co., T. E., Milwaukee, Wis.
Tite-Flex Metal Hose Co., 500 Frelinghuysen Ave., Newark, N. J.
Waldron Corp., John, New Brunswick, N. J.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
Whitney Chain & Mfg. Co., Hartford, Conn.

COUPLINGS, Hose
Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.
Hunt & Son, C. B., Salem, O.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.

COUPLINGS, Pipe
Dresser Mfg. Co., S. R., Bradford, Pa.

COUPLINGS, Shaft
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Boston Gear Works, Inc., North Quincy, Ill.
Cullman Wheel Co., Chicago, Ill.
DeLaval Steam Turbine Co., Trenton, N. J.
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Foote Bros. Gear & Mach Corp., 5301 S. Western Blvd., Chicago, Ill.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Hilliard Corporation, 102 W. 4th Ave., Elmira, N. Y.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
W. H. Nicholson & Co., 114 Oregon St., Wilkes-Barre, Pa.
Philadelphia Gear Works, Philadelphia, Pa.
Power Transmission Council, 1 Atlantic St., Stamford, Conn.
Royersford Fdry. & Mach. Co. Inc., Main St., Royersford, Pa.
Smith Co., T. L., Milwaukee, Wis.

CRANES
American Mono-Rail Co., 13113 Athens Ave., Cleveland, Ohio
Automatic Transportation Co., 59 W. 87th St., Chicago, Ill.
Baker-Rauling Co., 2164 W. 25th St., Cleveland, Ohio
Canton Fdry. & Mach. Co., 6400 Breakwater Ave., Cleveland, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Crane & Engrg. Co. Wickliffe, Ohio
Curtis Pneumatic Machinery Co., 1924 Kienler Ave., St. Louis, Mo.
Elwell-Parker Electric Co., 4511 St. Clair Avenue, Cleveland, Ohio
Euclid Crane & Hoist Co., Euclid, Ohio
Hanson Clutch & Machinery Co., Tiffin, Ohio
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Northern Engineering Works, Chene & Atwater Sts., Detroit, Mich.
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio
David Round and Son, Newburgh Station, Cleveland, Ohio
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Wright Mfg. Div. Amer. Chain Co. Inc., Bridgeport, Conn.
Whiting Corp., Harvey, Ill.
Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Phila., Pa.

CRANES, Overhead Traveling
American Mono-Rail Co., 13113 Athens Ave., Cleveland, Ohio
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Crane & Engrg. Co., Wickliffe, Ohio
Curtis Pneumatic Machinery Co., 1924 Kienler Ave., St. Louis, Mo.
Electro Lift, Inc., 30 Church St., N. Y. C.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Independent Pneumatic Tool Co., Chicago, Ill.
Industrial Brown Hoist Corp., Cleveland, O.
Morgan Engineering Co., Alliance, Ohio
Northern Engineering Works, Chene & Atwater Sts., Detroit, Mich.
David Round and Son, Newburgh Station, Cleveland, Ohio
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.
Wright Mfg. Div. Amer. Chain Co. Inc., Bridgeport, Conn.
Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Phila., Pa.

CRANES, Portable Floor
Automatic Transportation Co., 59 W. 87th St., Chicago, Ill.
Baker-Rauling Co., 2164 W. 25th St., Cleveland, Ohio
Canton Fdry. & Mach. Co., 6400 Breakwater Ave., Cleveland, Ohio
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Elwell-Parker Electric Co., 4511 St. Clair Ave., Cleveland, Ohio
David Round and Son, Newburgh Station, Cleveland, Ohio
Savage Co., W. J. Clinch Ave., and Tenth St., Knoxville, Tenn.

CRIMPERS
E. W. Bliss Co., Brooklyn, N. Y.
Cincinnati Shaper Co., Cincinnati, Ohio
New Albany Mach. Mfg. Co., New Albany, Ind.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Center St., Southington, Conn.

CRIMPERS, Wire
Automatic Machine Co., Bridgeport, Conn.

CRUSHERS, Steel Chip, Stationary and Portable
Marburg Brothers, Inc., 99 West St., N. Y. C.

CUSHIONS, Die
Bliss Co., E. W., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Marquette Tool & Mfg. Co., Toledo, Ohio
V. & O. Press Co., Hudson, N. Y.

CUTTER BLADES, Milling, Boring and Reaming
Barber-Colman Co., 1200 River St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.

WHERE-TO-BUY DIRECTORY

CUTTER BLADES, Milling, Boring and Reaming (Continued)
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Colonial Broach Co., Detroit, Mich.
Davis Boring Tool Co. (Div. Larkin Packer Co.) 6200 Maple Ave., St. Louis, Mo.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Firth-Sterling Steel Co., McKeesport, Pa.
Gairing Tool Co., 1629 Lafayette Blvd., Detroit, Mich.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Haynes Stellite Co., Kokomo, Indiana.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kelly Reamer Co., 3775 Ridge Road, Cleveland, Ohio
McCrosky Tool Corporation, 1340-80 South Main St., Meadville, Pa.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 435 Capitol Ave., Hartford, Conn.
Production Tool Co., 6474 Le Grande Ave., Detroit, Mich.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Tungsten Carbide Tool Co., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.
Wesson Co., Detroit, Mich.

CUTTERS, Angle
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 1629 Lafayette Blvd., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Union Twist Drill Co., Butterfield Division, Derby Line, Vt.

CUTTERS, Die Sinking
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Eclipse Counterbore Co., Detroit, Mich.
Gairing Tool Co., 1629 Lafayette Blvd., Detroit
George Gorton Machine Co., 1107 13th St., Racine, Wis.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Union Twist Drill Co., Athol, Mass.

CUTTERS, Formed
Atkins & Co., E. C., Indianapolis, Ind.
Barber-Colman Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Cleveland Twist Drill Co., Cleveland, Ohio
Colonial Broach Co., Detroit, Mich.
Consolidated Machine Tool Corp., Rochester, N. Y. (Modern Tool Works)
Detroit Tap & Tool Co., Detroit, Mich.
Disston & Sons, Inc., Henry, Tacony, Phila., Pa.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corp., Detroit
Firth-Sterling Steel Co., McKeesport, Pa.
Gairing Tool Co., 1629 Lafayette Blvd., Detroit
Gammons Halmon Co., Manchester, Conn.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Gorton Machine Co., Geo. Racine, Wis.
Haynes Stellite Co., Kokomo, Ind.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kelly Reamer Co., 3775 Ridge Road, Cleveland, Michigan Tool Co., Detroit, Mich.
Morrison Machine Products Div. Elmira, N. Y.
Morse Twist Drill & Machine Co., New Bedford, Mass.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., Detroit, Mich.
O. K. Tool Co., Shelton, Conn.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.

CUTTERS, Formed (Continued)
Production Tool Co., Detroit, Mich.
Producto Machine Co., Bridgeport, Conn.
Reed-Prentice Corp., Worcester, Mass.
Standard Tool Co., Cleveland, Ohio
Super Tool Co., Detroit, Mich.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Tomkins Johnson Co., Jackson, Mich.
Tungsten Carbide Tool Co., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.
Waltham Machine Works, Waltham, Mass.
Wesson Co., Detroit, Mich.

CUTTERS, Gear
Apex Tool & Cutter Co., Shelton, Conn.
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Barber-Colman Co., 1200 River St., Rockford, Ill.
Bilgram Gear & Machine Works, 1235 Spring Garden St., Philadelphia, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Clough, A. W., Meriden, Conn.
Colonial Broach Co., Detroit, Mich.
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.
Farrell-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Gleason Works, 1000 University Ave., Rochester.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
O. K. Tool Co., Shelton, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Waltham Machine Works, Waltham, Mass.

CUTTERS, Hole
D & D Tool Co., 2518 Western Ave., Seattle, Wash.
R & L Tool Co., Philadelphia, Pa.

CUTTERS, Keyseater
Baker Bros., Inc., Post St., Toledo, Ohio
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Colonial Broach Co., Detroit, Mich.
Connecticut Broach & Mach. Co., New London, Conn.
Davis Keyseater Co., Rochester, N. Y.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Mitts & Merrill, 913 Tilden St., Saginaw, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Morton Mfg. Co., Muskegon Heights, Mich.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

CUTTERS, Milling
Apex Tool & Cutter Co., Shelton, Conn.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Barber-Colman Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Colonial Broach Co., Detroit, Mich.
Consolidated Machine Tool Corp., Rochester, N. Y.
Detroit Tap & Tool Co., Detroit, Mich.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.
Fansteel Metallurgical Corp, 2200 Sheridan Rd. N., Chicago, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Gairing Tool Co., 1629 Lafayette Blvd., Detroit.
Gammons Holman Co., 405 Main St., Manchester, Conn.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
George Gorton Machine Co., 1103 13th St., Racine, Wis.
Haynes-Stellite Co., Kokomo, Ind.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Kelly Reamer Co., 3775 Ridge Road Cleveland, Ohio
McCrosky Tool Corp., 1340-80 S. Main St., Meadville, Pa.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
O. K. Tool Co., Shelton, Conn.

CUTTERS, Milling (Continued)
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Tool Co., 6474 Le Grande Ave., Detroit, Mich.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Standard Tool Co., The 6918 Central Ave., Cleveland, Ohio
Super Tool Co., 605 Boyer Bldg., Detroit, Mich.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Tungsten Carbide Tool Co., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.
Waltham Machine Works, Waltham, Mass.
Wesson Co., Detroit, Mich.

CUTTERS, Milling, Cemented Carbide (see Tools, Cemented Carbide)

CUTTERS, Pipe, Hand
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Ridge Tool Co., Elyria, Ohio

CUTTERS, Spotfacing
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Firth-Sterling Steel Co., McKeesport, Pa.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Haynes-Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Standard Tool Co., 6918 Central Ave., S. E., Cleveland, Ohio
Tungsten Carbide Tool Co., Detroit, Mich.

CUTTERS, Welch Plug
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Eclipse Counterbore Co., Detroit, Mich.
Gairing Tool Co., 1629 Lafayette Blvd., Detroit

CUTTING AND WELDING APPARATUS
Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
Linde Air Products Co., Inc., 30 E. 42nd St., New York, N. Y.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Oster Mfg. Co., The, 2057 E. 61st Pl., Cleveland

CUTTING COMPOUNDS (see Compounds, Cutting)

CUTTING MACHINES, Flame
Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
Linde Air Products Co., Inc., 30 E. 42nd St., New York, N. Y.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

CUTTING-OFF MACHINES, Abrasive Wheel
Bethlehem Fdry. & Mach. Co., Bethlehem, Pa.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Andrew C. Campbell Division (Amer. Chain & Cable Co., Inc.), 929 Connecticut Ave., Bridgeport, Conn.
Challenge Machinery Co., Grand Haven, Mich.
Cincinnati Electrical Tool Co., Madison & Edwards Rd., Cincinnati, Ohio
Cochrane-Bly Co., 15 James Pl., Rochester, N. Y.
de Sanno, A. P. & Sons, Philadelphia., Pa.
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Meeta Machine Company, Post Office Box 1466, Pittsburgh, Pa.
Oliver Machinery Co., Grand Rapids, Mich.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Tabor Mfg. Co., 6225 Tacony St., Phila., Pa.

CUTTING-OFF MACHINES, Cold Saw
Bethlehem Fdry. & Mach. Co., Bethlehem, Pa.
Cochrane-Bly Co., 15 St. James Pl., Rochester, N. Y.
Consolidated Machine Tool Corp., Rochester, N. Y. (Newton Div.).
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Porter-McLeod Mach. Tool Co., Hatfield, Mass.
United Engrg & Fdry. Co., Pittsburgh, Pa.

CUTTING-OFF MACHINES, Hack and Band Saw
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Avery Drilling Machine Co., Inc., Cincinnati,
Boice Crane Co., Toledo, Ohio
Cochrane-Bly Co., 15 St. James Pl., Rochester
Continental Mach. Spec. Inc., Minneapolis, Minn.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Laidlaw, Wm., Inc., 7 Greenwich St., Belmont, N. Y.
Marburg Brothers, Inc., 90 West St., N. Y. C.
Olin Machinery Co., Grand Rapids, Mich.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.

WHERE-TO-BUY DIRECTORY

CUTTING-OFF MACHINES (Continued)
Royersford Fdry. & Mach. Co. Inc., Royersford, Pa.
Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.

CUTTING-OFF MACHINES, Pipe
Automatic Machine Co., Bridgeport, Conn.
Bardons & Oliver, Inc., 1133 W. 9th St., Cleveland, O.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio
Bethlehem Fdry. & Mach. Co., Bethlehem, Pa.
Cochrane-Bly Co., 15 James Pl., Rochester, N. Y.
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Heller Machine Co., 114 Liberty St., N. Y. C.
Landis Machine Co., Inc., Church & 5th Sts., Waynesboro, Pa.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
Oster Mfg. Co., The, 2057 E. 61st Pl., Cleveland, Ohio
Rickert-Shafer Co., 613 W. 11th St., Erie, Pa.
Scheri Co., Inc., Geo., 128 Lafayette St., N. Y. C.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Western Tool & Mfg. Co., Springfield, Ohio

CUTTING-OFF TOOLS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Barber-Colman Co., 1200 River St., Rockford, Ill.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio
Brown & Sharpe Mfg. Co., Providence, R. I.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Colonial Broach Co., Detroit, Mich.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Gisholt Machine Co., Madison, Wis.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Macklin Co., Jackson, Mich.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Broach Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
National Twist Drill & Tool Co., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 435 Capitol Ave., Hartford, Conn.
Ready Tool Co., The, 550 Iranistan Ave., Bridgeport, Conn.
Stark Tool Co., Waltham, Mass.
Sterling Grinding Wheel Co., Broad Ave., Tiffin, Ohio
Super Tool Company, 356 E. Congress St.
Tungsten Carbide Tool Co., Detroit, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Wesson Co., Detroit, Mich.
Western Tool & Mfg. Co., Springfield, Ohio

CUTTING-OFF TOOLS, Cemented Carbide (see Tools, Cemented Carbide)

CUTTING-OFF WHEELS, Abrasive
Abrasive Company, Tacony & Fraley Sts., Philadelphia, Pa.
Allison Company, 257 Island Brook Ave., Bridgeport, Conn.
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
de Sanno, A. P. & Sons, Inc., 1615 McKean St., Philadelphia, Pa.
Norton Co., Worcester, Mass.
Manhattan Rubber Mfg. Co., Div. of Raybestos-Manhattan Inc., Passaic, N. J.

CYLINDER GRINDERS
Moline Tool Co., 102 20th St., Moline, Ill.

CYLINDER GRINDING HONES
American Hollow Boring Co., Erie, Pa.
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

CYLINDERS, Air and Hydraulic
American Hollow Boring Co., 1057 W. 19th St., Erie, Pa
Hannifin Manufacturing Co., 621 South Kolmar
Keckley Co., O. C., 567 Washington Blvd., Chicago, Ill.
Tomkins-Johnson Co., 515 N. Mechanic St., Jackson, Mich.

CYLINDRICAL SQUARES
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

DEALERS, Machinery (See Searchlight Section)
Atlas Equipment Co., 116 S. Clinton St., Chicago, Ill.
Adams, Ogden R., 266 State Street, Rochester.
Advance Machinery Exchange, Inc., 182 Centre St., N. Y. C.
Alliance Machinery Exchange, 206 Centre St., N. Y. C.
Beal & Co., Jos., 465 Atlantic Ave., Boston
Beatty Machy. & Mfg. Co., 948 150th St., Hammond, Ind.
Belyea Co., Inc., 151 W. 18th St., N. Y. C.
Bennett-Rafkin Machy. Co., 30 Church St., N. Y. C.

DEALERS, Machinery (See Searchlight Section) (Continued)
Bernstein, G. M., 10 So. Clinton St., Chicago
Botwink Bros., Inc., 67 Water St., New Haven.
Bradley Machinery Co., 529 E. Jefferson Ave., Detroit, Mich.
Brandt, W. E., 513 Empire Bldg., Pittsburgh.
Buffalo Machy. Co., 833 Grant St., Buffalo
Cincinnati Machy. & Supply Co., 28 West 2nd St., Cincinnati, Ohio
Consolidated Used Machinery Mart, 440 N. Oakley Blvd., Chicago, Ill.
Delta Equipment Co., 148 North Third St., Philadelphia, Pa.
Dony Machine Co., D. E., 115 Bay St., Rochester, N. Y.
Eastern Machinery Co., 3620 Spring Grove Ave., Cincinnati, Ohio
Emerman & Co., Louis E., 1761 Elston Ave., Chicago, Ill.
Falk Mill Supply Co., Inc., 18 Ward St., Rochester, N. Y.
Fraser, E. L., 141 N. Third St., Phila., Pa.
Ganey Machinery Co., 125 Arthur St., Buffalo
General Machinery Corp., 140 Federal St., Boston, Mass.
Goldman & Co., Harvey H., 10567 Gratiot Ave., Detroit, Mich.
Hill-Clarke Machinery Co., 651 W. Washington Blvd., Chicago, Ill.
Hyman & Son, Jos., Tioga, Livingston & Almond Sts., Philadelphia, Pa.
Indianapolis Machy. & Supply Co., 1959 S. Meridian St., Indianapolis, Ind.
Industrial Equipment Co., 850 Broad St., Newark, N. J.
Industrial Machy. Co., 2100 Fletcher Ave., Indianapolis, Ind.
International Machinery Co., 3171 Bellevue Ave., Detroit, Mich.
Interstate Machinery Co., 130 S. Clinton St., Chicago, Ill.
Iron & Steel Products Co., Railway Exchange, Chicago, Ill.
Iroquois Machinery Co., 662 Ohio St., Buffalo
Land, L. J., 140 Grand St., New York City
Leach Machinery Co., H., 296 Dyer St., Providence, R. I.
Lucas & Son, Inc., J. L., 3 Fox St., Bridgeport, Conn.
Lunney, Frank J., 953 N. Front St., Phila.
Machinery Dealers, Inc., 419 Chapel St., New Haven, Conn.
McCabe & Sheeran Machy. Corp., 50 Church St., N. Y. C.
Marr-Galbreath Machinery Co., 57 Water St., Pittsburgh, Pa.
Midwest Equipment Co., 630 W. Lake St., Chicago, Ill.
Miles Machinery Co., Saginaw, W. S., Mich.
Monarch Machinery Co., 329 No. Third St., Phila., Pa.
Morey Machinery Co., Inc., 410 Broome st., New York City
Motor Repair & Mfg. Co., The, 1548 Hamilton Ave., Cleveland, Ohio
Moyer, J. N., 465 North 5th St., Philadelphia.
O'Brien Machinery Co., 113 North 13th St., Philadelphia, Pa.
Ott Machinery Sales, Inc., 546 Second Ave., Detroit, Mich.
Patron-Millwright Machy. & Transmission Co., 154 Grand St., N. Y.
Reliance Machy. Sales Co., 1407 Brighton Rd. N. S., Pittsburgh, Pa.
Reynolds & Son, Inc., Geo T., 171 Pine St., Providence, R. I.
Riverside Machinery Depot, 251 St. Aubin Ave., Detroit, Mich.
Rosenkranz & Weisbecker, 149 Broadway, N. Y. C.
Ross Power Equipt. Co., Indianapolis, Ind.
Scott-Bansbach Machy. Co., 4611 W. 20th St., Chicago, Ill.
Segal Machinery Co., 113 S. Clinton St., Chicago, Ill.
Simmons Machine Tool Corp., N. Broadway, Albany, N. Y.
Standard Machinery & Supply Co., The, 218 High St., Boston, Mass.
Strong, Carlisle & Hammond Co., 1392 W. 3rd St., Cleveland, Ohio
Sun Machinery Co., Inc., 39 Van Buren St., Newark, N. J.
Surplus Material & Machy. Co., 8733 Kercheval Ave., Detroit, Mich.
Telephone Co., Pittsfield, Mass.
Vine, R. A., 652 W. Willis Ave., Detroit
Victor Machinery Co., 128 S. Clinton St., Chicago, Ill.
Wiener Machy. Co., 237 Centre St., N. Y. C.
West Penn Machy. Co., 1208 House Building, Pittsburgh, Pa.
Wigglesworth Machy. Co., 199 Bent St., Cambridge, Mass.
Wroe Co., C. I., 11 Park Pl., New York City
Wyatt Machinery Co., C. G., 1203 Princess Ave., Camden, N. J.

DECORATIVE METAL PARTS
Crowe Name Plate and Mfg. Co., 1749 Grace St., Chicago, Ill.

DEEP DRAWING AND STAMPING SHEETS (see Steel, Sheet)

DEGREASING MACHINES
American Mach. & Metals, Inc., 100 Sixth Ave., New York City
Blakeslee & Co., G. S., Cicero Sta. Chicago, Ill.
Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich.
Ransohoff, Inc., N., W. 71st St., Carthage, Cincinnati, O.

DEMAGNETIZERS
Abrasive Machine Tool Co., E. Providence, R. I.
Blanchard Machine Co., 64 State St., Cambridge, Mass.
Frampton Electrical Equipment Co., Dayton, Ohio
L-W Chuck Co., Toledo, O.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
O. S. Walker Co., Worcester, Mass.

DIAL INDICATORS (see Gages, Dial)

DIALS FOR CLOCKS, Instruments, Etc.
Crowe Name Plate and Mfg. Co., 1749 Grace St., Chicago, Ill.

DIAMONDS AND DIAMOND TOOLS
Desmond-Stephan Mfg. Co., Urbana, Ohio
Gilmore & Co., F. F., 112 Dartmouth St., Boston, Mass.
George Gorton Machine Co., Racine, Wis.
Kent-Owens Machine Co., Toledo, Ohio
Karelson, Inc., E., New York, N. Y.
Norton Company, Worcester, Mass.
Smit & Son, J. K., N. Y. C.
Stark Tool Co., Waltham, Mass.
Wesson Co., Detroit, Mich.

DIAMOND GRINDING WHEELS
Carborundum Co., Niagara Falls, N. Y.
Norton Co., 1 New Bond St., Worcester, Mass.
Prosser and Sons, Co., Thos., 120 Wall St., New York

DIAMONDS, Industrial
Crafts & Co., Arthur A, 532 Commonwealth Ave., Boston, Mass.
Desmond-Stephan Mfg. Co., 317 Walnut St., Urbana, O.
Smit & Son, J. K., N. Y. C.
Wheel Trueing Co., Detroit, Mich.

DIE CASTINGS
St. John X-Ray Service, Inc., 30 Thomson Ave., Long Island City, N. Y.

DIE CASTING MACHINES
Continental Machine Specialties, Inc., 1301 Washington Ave. S., Minneapolis, Minn.
Hack Machine Co., 440 N. Oakley Blvd., Chicago, Ill.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Harvill Inc., H. L., 2344 E. 38th St., Los Angeles, Cal.
Kux-Lohner Machine Co., 2145 Lexington St., Chicago, Ill.
Madison-Kipp Corp., Madison, Wis.
Phoenix Ice Mach. Corp., 2703 Church Ave., Cleveland, O.
Reed-Prentice Co., Worcester, Mass.

DIE CASTINGS (see Castings Die)

DIE CUTTING MACHINES
Cincinnati Milling Machine Co., The Cincinnati
George Gorton Machine Co., 1103-13th St., Racine, Wis.
Grob Bros., Grafton, Wis.
Ingersoll Milling Mach. Co., Rockford, Ill.
Marburg Bros., Inc., 90 West St., New York
Oliver Instrument Co., Adrian, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., Worcester, Mass.

DIE CUSHIONS
Bliss Co., E. W., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Driver-Harris Co., Harrison, N. J.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Marquette Tool & Mfg. Co., Toledo, O.

DIE HEADS, Self-Opening
Acme Machinery Co., St. Clair Ave., N. E., Cleveland, O.
Eastern Machine Screw Corp. New Haven, Conn.
Geometric Tool Co., New Haven, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
Murchey Machine and Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio
National Machinery Co., Tiffin, O.
Rickert Shafer Co., Erie, Pa.

DIE HEADS, Solid Adjustable
Consolidated Mach. Tool Corp., Rochester, N. Y. (Modern Tool Works)
Eastern Machine Screw Corp. New Haven, Conn.
Errington Mech. Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Geometric Tool Co., Lake & Valley Sts., New Haven, Conn.
Landis Machine Co., Inc., Church and 5th Sts., Waynesboro, Pa.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.

DIE MAKER'S BLUE
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Dykem Co., The, St. Louis, Mo.

DIE MAKERS' SUPPLIES
Baumbach Mfg. Co., E. A., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Lathe and Tool Co., Oakley, Cincinnati, Ohio
Cunningham Co., M. E., 107 E. Carson St., Pittsburgh, Pa.
Danly Machine Specialties, Inc., Chicago, Ill.
Marburg Brothers, Inc., 90 West St., N. Y. C.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
U. S. Tool Co., Inc., Ampere, N. J.

DIE MAKING MACHINES (see Die Cutting Machines)

DIE METAL, Low Temperature Melting
Cerro de Pasco Copper Corp., 44 Wall St., N. Y. C.

WHERE-TO-BUY DIRECTORY

DIE SAWING AND FILING MACHINES (see Filing Machine and Sawing Machines)

DIE SETS
Baumbach Mfg. Co., E. A., Chicago, Ill.
Card Mfg. Co., S. W. (Div. Union Twist Drill), Mansfield, Mass.
Danly Machine Specialties, Inc., Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Producto Machine Co., Bridgeport, Conn.
U. S. Tool Co., Inc., Ampere, N. J.

DIE SHAPERS
Card Mfg. Co., S. W. (Div. Union Twist Drill Co.), Rumford Ave., Mansfield, Mass.
Cochrane-Bly Co., Rochester, N. Y.
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Preis Engraving Mach. Co., H. P., 155 Summit St., Newark, N. J.

DIE SINKING MACHINES
Preis Engraving Mach. Co., H. P., 15 Summit St., Newark, N. J.

DIE SPRINGS
Danly Mach. Spec. Inc., Chicago, Ill.

DIE STEELS (see Steels, Die)

DIE STOCKS, (see Stocks, Die)

DIES, Adjustable and Self-Opening
Acme Machinery Co., 4533 St. Clair Ave. N. E., Cleveland, Ohio
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio
Card Mfg. Co., S. W. (Div. Union Twist Drill), Mansfield, Mass.
Consolidated Machine Tool Corp. (Modern Tool Works), Rochester, N. Y.
Eastern Machine Screw Corp., New Haven, Conn.
Errington Mechanical Laboratory, Stapleton, Staten Island, N. Y.
Geometric Tool Co., New Haven, Conn.
Greenfield Tap and Die Corp., Greenfield, Mass.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
Murchey Machine and Tool Co., Detroit, Mich.
National Acme Company, Cleveland, Ohio
National Machry. Co., Tiffin, O.
Oster Mfg. Co., Cleveland, Ohio
Pipe Machinery Co., Cleveland, Ohio
Rickert-Shafer Co., Erie, Pa.
Union Twist Drill Co., Athol, Mass.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

DIES, Bronze, for forming and drawing
Ampco Metal Co., Milwaukee, Wis.
Cerro de Pasco Copper Corp., 44 Wall St., N. Y. C.

DIES, Drawing and Extrusion
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Taft-Peirce Mfg. Co., Woonsocket, R. I.

DIES, Drawing and Extrusion, Cemented Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ludlum Steel Co., Watervliet, N. Y.
Tungsten Elec. Corp., 540 39th St., Union City, N. J.

DIES, Embossing
Noble and Westbrook Mfg. Co., East Hartford, Conn.

DIES, Marking
Noble and Westbrook Mfg. Co., East Hartford, Conn.

DIES, Round Adjustable
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Card Mfg. Co., S. W. (Div. Union Twist Drill Co.) Rumford Ave., Mansfield, Mass.
Greenfield Tap and Die Corp, Greenfield, Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Winter Bros. Co., Wrentham, Mass.

DIES, Sheet Metal and Sub Press (see Contract Work)

DIES, Solid, Bolt Pipe
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Card Mfg. Co., S. W. (Div. Union Twist Drill), Mansfield, Mass.
Consolidated Machine Tool Corp., Rochester, N. Y. (Modern Tool Works)
Greenfield Tap and Die Corp., Greenfield, Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
Oster Mfg. Co., Cleveland, Ohio
Rickert-Shafer Co., Erie, Pa.
U. S. Tool Co., Inc., Ampere, N. J.

DIES, Steel Marking
Noble and Westbrook Mfg. Co., East Hartford, Conn.

DIES, Thread Rolling
Bath and Co., John, Worcester, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.

DIESEL ENGINES FOR MAIN POWER OR STAND-BY SERVICE (see Engines, Diesel)

DISKS, Circular Cutting
Atkins, E. C., and Co., 402 S. Illinois St., Indianapolis, Ind.
Disston & Sons, Inc., Henry, Tacony, Phila.
Morse Twist Drill and Machine Co., New Bedford, Mass.

DIVIDERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Starrett Co., The L. S., Athol, Mass.

DIVIDING HEADS
Hartford Special Machry. Co., Hartford, Conn.

DOGS, LATHE, MILLING MACHINE, ETC.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Bonney Forge & Tool Work, Allentown, Pa.
Cincinnati Lathe and Tool Co., Oakley, Cincinnati, Ohio
Hendey Machine Co., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Cincinnati
Ready Tool Co., The, Bridgeport, Conn.
Williams & Co., J. H., 75 Spring St., N. Y. C.

DOWEL PINS
Pittsburgh Stee. Co., Pittsburgh, Pa.
Producto Machine Co., Bridgeport, Conn.
U. S. Tool Co., Ampere, N. J.

DRAFTING MACHINES
Bruning Co. Inc., Chas., 102 Reade St., N. Y. C.
Keuffel & Esser Co., Adams St., Hoboken, N. J.
Universal Drafting Machine Co., Cleveland

DRAFTING MATERIAL
Bruning Co. Inc., Chas., 102 Reade St., N. Y. C.
Wade Instrument Co., Cleveland, O.
Wright Inc., L. G., Cleveland, Ohio

DRAFTING TABLES
Westbrook Equip. Co., 10016 Greenview Ave., Garfield Heights, Cleveland, O.
Wright Inc., L. G., 5209 Euclid Ave., Cleveland, Ohio

DRAFTING TEMPLATES
Turner Devices Inc., 1212A Mississippi Ave., St. Louis, Mo.
Wright Inc., L. G., Cleveland, Ohio

DRAFTS, Drill
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Morse Twist Drill and Machine Co., New Bedford, Mass.

DRAWING BOARDS
Twomley, H. E., 7154 Magnolia Ave., Riverside, Calif.

DRAWING MATERIALS
Bruning Co. Inc., Chas., 102 Reade St., N. Y. C.
Eraser Company, Inc., 120 E. Washington St., Syracuse, N. Y.
Turner Devices Inc., 1212A Mississippi Ave., St. Louis, Mo.
Wade Instrument Co., 2246 Brooklyn Station, Cleveland, O.

DRESSERS, Grinding Wheel
Atkins & Co., E. C., Indianapolis, Ind.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Carborundum Co., Niagara Falls, N. Y.
Desmond-Stephan Mfg. Co., Urbana, Ohio
Disston & Sons, Inc., Henry, Tacony, Phila.
Dumore Co., The, Racine, Wis.
Gilmore & Co., F. F., Boston, Mass.
Hanchett Mfg. Co., Big Rapids, Mich.
Karelsen, Inc., E., New York, N. Y.
Kershaw, F. A., Kent, Ohio
Lee & Son Co., K. O., Aberdeen, S. D.
Norton Co., 1 New Bond St., Worcester, Mass.
Smit & Son, J. K., N. Y. C.
Standard Tool Co., Cleveland, Ohio
Vincent Steel Process Co., 2434 Bellevue Ave., Detroit, Mich.
Vinco Tool Co., 7350 Central Ave., Detroit
Western Tool & Mfg. Co., Springfield, Ohio

DRILL CASES
Cleveland Twist Drill Co., Cleveland, Ohio
Greenfield Tap & Die Corp., Greenfield, Mass.
Huot Mfg. Co., St. Paul, Minn.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
National Twist Drill & Tool Co., Detroit, Mich.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

DRILL COLLAR FORGINGS, Hollow Bored
American Hollow Boring Co., Erie, Pa.

DRILL DRIFTS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Standard Tool Co., 6918 Central Ave., S. E., Cleveland, Ohio

DRILL HOLDERS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Buhr Machine Tool Co., Ann Arbor, Mich.

DRILL INDEX
Huot Mfg. Co., St. Paul, Minn.

DRILL PRESS, Sensitive
Gisholt Machine Co., Madison, Wis.
Taylor-Winfield Co., Warren, O.

DRILL ROD, Tool Steel
Carpenter Steel Co., 109 W Bern St., Reading, Pa.

DRILL ROD, Tool Steel (Continued)
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Crucible Steel Co. of America, New York
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Verdin, Koppes, Verdin Co., 108 W. 2nd St., Cincinnati, Ohio

DRILL SOCKETS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Buhr Machine Co., Ann Arbor, Mich.
Cleveland Twist Drill Co., Cleveland, Ohio
Gisholt Machine Co., Madison, Wis.
Greenfield Tap and Die Corp., Greenfield, Mass.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Britain, Conn.
National Twist Drill and Tool Co., Detroit
Standard Tool Co., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

DRILL SPEEDERS
Buhr Machine Co., Ann Arbor, Mich.
Graham Mfg. Co., Providence, R. I.
Hoefer Mfg. Co., Freeport, Ill.

DRILL STANDS
Black & Decker Mfg. Co., 716 Pennsylvania Ave., Towson, Md.
James Clark Jr., Elec. Co., 600 Bergman St., Louisville, Ky.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, Ohio
Cleveland Twist Drill Co., Cleveland, Ohio
Greenfield Tap and Die Corp., Greenfield, Mass.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Huot Mfg Co., St. Paul, Minn.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
National Twist Drill and Tool Co., Detroit
Signal Electric Mfg. Co., Menominee, Mich.
Skilsaw Inc., 3310 Elston Ave., Chicago, Ill.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Standard Tool Co., Cleveland, Ohio
Stanley Elec. Tool Div., The Stanley Works, New Britain, Conn.
Union Twist Drill Co., Athol, Mass.
United State Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio

DRILLING AND CENTERING MACHINES (see Centering Machines)

DRILLING AND TAPPING HEADS, Multiple
Baker Bros., Inc., Toledo, Ohio
Barnes Drill Co., Rockford, Ill.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Buhr Machine Tool Co., Ann Arbor, Mich.
Cross Gear and Machine Co., Detroit, Mich.
Defiance Machine Works, Defiance, Ohio
Errington Mechanical Laboratory, Stapleton, Staten Island, N. Y.
Ettco Tool Co., Brooklyn, N. Y.
Ex-Cello-O Corp., Detroit
Foote-Burt Co., Cleveland, Ohio
Greenlee Bros. and Co., Rockford, Ill.
Hoefer Mfg. Co., Freeport, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., Worcester, Mass.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Snyder Tool & Engrg. Co., 3400 E. Lafayette Ave., Detroit, Mich.

DRILLING AND TAPPING MACHINES, Dial Feed
Bodine Corp., 1720 Fairfield Ave., Bridgeport, Conn.
Cleereman Machine Tool Co., Green Bay, Wis.
Kingsbury Mach. Tool Corp., Keene, N. H.

DRILLING AND TAPPING UNITS
Allen Co., Chas. G., Barre, Mass.
Avey Drilling Machine Co., Cincinnati, Ohio
Barnes Co., W. F. & John, Rockford, Ill.
Barnes Drill Co., Rockford, Ill.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Bryant Machinery and Engrg. Co., 400 W. Madison St., Chicago, Ill.
Buhr Machine Tool Co., Ann Arbor, Mich.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Cleereman Machine Tool Co., Green Bay, Wis.
Ex-Cell-O Corp., Detroit, Mich.
Foote-Burt Co., Cleveland, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Greenlee Bros. and Co., Rockford, Ill.
Hoefer Mfg. Co., Freeport, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Partool Machine Co., 9111 Schaefer Rd., Detroit, Mich.

WHERE-TO-BUY DIRECTORY

DRILLING MACHINES, Automatic and Semi-Automatic
Allen Co., Chas. G. Barre, Mass.
Avey Drilling Machine Co., Cincinnati, Ohio
Baker Bros., Inc., Toledo, Ohio
Barnes Co., W. F. & John, Rockford, Ill.
Barnes Drill Co., Rockford, Ill.
Baush Machine Tool Co., 153 Wason Ave., Springfield, Mass.
Bodine Corp., 1720 Fairfield Ave., Bridgeport
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Buhr Machine Tool Co., Anna Arbor, Mich.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.
Consolidated Mach. Tool Corp., Rochester, N. Y.
Cross Gear and Machine Co., Detroit, Mich.
Davenport Machine Tool Co., Rochester, N. Y.
Davis-Thompson Co., 6619 West Mitchell St., Milwaukee, Wisconsin
Defiance Machine Works, Defiance, Ohio
Dreses Machine Tool Co., Cincinnati, Ohio
Ex-Cell-O Corp., Detroit
Foote Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Goss & deLeeuw Machine Co., New Britain,
Greenlee Bros. and Co., Rockford, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., Worcester, Mass.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Moline Tool Co., Moline, Ill.
Morris Machine Tool Co., Court & Harriet Sts., Cincinnati, Ohio
National Automatic Tool Co., Richmond, Ind.
Partool Mach. Co., 9111 Schaefer Rd., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rockford Drilling Machine Co., Rockford, Ill.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Snyder Tool & Engrg. Co., 3400 E. Lafayette Ave., Detroit, Mich.
Taylor and Fenn Co., 54 Arch St., Hartford,

DRILLING MACHINES, Bench
Allen Co., Chas. G., Barre, Mass.
Atlas Press Co., 1849 N. Pitcher St., Kalamazoo, Mich.
Automatic Machine Co., 113 N. Washington Ave., Bridgeport, Conn.
Avey Drilling Machine Co., Cincinnati, Ohio
W. F. & John Barnes Co., Rockford, Ill.
Boice Crane Co., Toledo, Ohio
Buffalo Forge Co., Buffalo, N. Y.
Buhr Machine Tool Co., Ann Arbor, Mich.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Cincinnati Bickford Tool Co., Oakley, Cincinnati,
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Dumore Co., Racine, Wis.
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Hamilton Tool Co., Hamilton, O.
Henry & Wright Mfg. Co., Hartford, Conn.
High Speed Hammer Co., Inc., Rochester, N. Y.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., Worcester, Mass.
Moline Tool Co., 102 20th St., Moline, Ill.
Muehlmatt, Adolph, Cincinnati, O.
Munding Mfg. Co., 703 E. Colorado Blvd., Glendale, Cal.
Pratt & Whitney Div. Niles-Bement-Pond Co. 436 Capitol Ave., Hartford, Conn.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.
Skilsaw, Inc., Chicago, Ill.
Taylor and Fenn Co., Hartford, Conn.
Taylor Mfg. Corp., Milwaukee, Wis.

DRILLING MACHINES, Gang
Automatic Machine Co., Bridgeport, Conn.
Baker Bros. Inc., Toledo, Ohio
Barnes Co., W. F. & John, Rockford, Ill.
Barnes Drill Co., Rockford, Ill.
Bryant Machinery and Engrg. Co., 400 W. Madison St., Chicago, Ill.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Cleereman Machine Tool Co., Green Bay, Wis.
Consolidated Machine Tool Co., Rochester, N. Y. (Colburn Div.)
Defiance Machine Works, Defiance, O.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Fox Machine Co., 1410 W. Ganson St. Jackson, Mich.
Green Bay Barker Mach. & Tool Wks., Green Bay, Wis.
Henry & Wright Mfg. Co., Hartford, Conn.
High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Langelier Mfg. Co., Cranston, R. I.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Snyder Tool & Engrg. Co., 3400 E. Lafayette Ave., Detroit, Mich.

DRILLING MACHINES, Heavy Duty
Allen Co., Chas. G., Barre, Mass.
Baker Bros. Inc., Toledo, Ohio
Barnes Drill Co., Rockford, Ill.

DRILLING MACHINES, Heavy Duty (Cont.)
Barnes Co., W. F. and John, Rockford, Ill.
Bryant Machinery and Engineering Co., 400 W. Madison St., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Cleereman Machine Tool Co., Green Bay, Wis.
Consolidated Machine Tool Corp., Rochester,
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Defiance Machine Works, Defiance, Ohio
Dreses Machine Tool Co., Cincinnati, Ohio
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Goss & deLeeuw Machine Co., New Britain, Conn.
Ingersoll Milling Machine Co., Rockford, Ill.
Leland-Gifford Co., Worcester, Mass.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Rockford Drilling Machine Co., Rockford, Ill.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.

DRILLING MACHINES, Horizontal
Allen Co. Chas. G., Barre, Mass.
Avey Drilling Machines Co., Cincinnati, Ohio
Baker Bros. Inc., Toledo, Ohio
Barnes Co., W. F. & John, Rockford, Ill.
Baush Machine & Tool Co., 156 Wason Ave., Springfield, Mass.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Buhr Machine Tool Co., Ann Arbor, Mich.
Consolidated Machine Tool Corp., Rochester
Defiance Machine Works, Defiance, Ohio
Dreses Machine Tool Co., Cincinnati, Ohio
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Frew Machine Co., Philadelphia, Pa.
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Giddings and Lewis Machine Tool Co., Fond du Lac, Wis.
Goss & deLeeuw Machine Co., New Britain
Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Moline Tool Co., Moline, Ill.
Murchey Machine and Tool Co., Detroit, Mich.
National Automatic Tool Co., Richmond, Ind.
Partool Mach. Co., 9111 Schaefer Rd., Detroit, Mich.
Rockford Drilling Machine Co., Rockford, Ill.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Sellers and Co. Inc., Wm., Philadelphia, Pa.
Universal Boring Machine Co., Hudson, Mass.

DRILLING MACHINES, Horizontal Duplex
Barnes Co., W. F. & John, Rockford, Ill.
Defiance Machine Works, Defiance, Ohio
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.

DRILLING MACHINES, Multi-Spindle
Allen Co., Chas. G., Barre, Mass.
Automatic Machine Co., Bridgeport, Conn.
Avey Drilling Machine Co., Cincinnati, Ohio
Baker Bros. Inc., Toledo, Ohio
Barnes Drill Co., Rockford, Ill.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bodine Corp., 1720 Fairfield Ave., Bridgeport
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Buffalo Forge Co., Buffalo, N. Y.
Buhr Machine Tool Co., Ann Arbor, Mich.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Consolidated Machine Tool Corp., Rochester.
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Defiance Machine Works, Defiance, Ohio
Delta Mfg. Co., 600 E. Vienna Ave., Milwaukee, Wis.
Ex-Cell-O Corp., Detroit, Mich.
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Goss & deLeeuw Machine Co., New Britain
Greenlee Bros. and Co., Rockford, Ill.
Hamilton Tool Co., Hamilton, O.
Henry & Wright Mfg. Co., Hartford, Conn.
High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Hoefer Mfg. Co., Freeport, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., Worcester, Mass.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Partool Mach. Co., 9111 Schaefer Rd., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rockford Drilling Machine Co., Rockford, Ill.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.

DRILLING MACHINES, Multi-Spindle (Cont.)
Scherr Co., Geo., 128 Lafayette St., N. Y. C.
Taylor and Fenn Co., Hartford, Conn.
Thomas Machine Mfg. Co., Pittsburgh, Pa.

DRILLING MACHINES, Radial
American Tool Works Co., Cincinnati, Ohio
Bryant Machinery and Engineering Co., 400 W. Madison St., Chicago, Ill.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Carlton Machine Co., Cincinnati, Ohio
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Cleveland Punch and Shear Works Co., Cleveland, Ohio
Consolidated Machine Tool Corp., Rochester
Dreses Machine Tool Co., Cincinnati, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Heller Machine Co., 114 Liberty St., N. Y. City
Leland-Gifford Co., Worcester, Mass.
Morris Machine Tool Co., Court & Harriet Sts., Cincinnati, Ohio
Wickes Bros., Saginaw, Mich.

DRILLING MACHINES, Sensitive
Allen Co., Chas. G., Barre, Mass.
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Avey Drilling Machine Co., Cincinnati, Ohio
Boice Crane Co., Toledo, Ohio
Buhr Mach. Tool Co., Ann Arbor, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
James Clark Jr. Elec. Co., 600 Bergman St., Louisville, Ky.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Dumore Co., Racine St., Racine, Wis.
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Hamilton Tool Co., Hamilton, O.
Henry & Wright Mfg. Co., Hartford, Conn.
High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., Worcester, Mass.
National Automatic Tool Co., Richmond, Ind.
Partool Mach. Co., 9111 Schaefer Rd., Detroit
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Ryerson & Son., Jos. T., Chicago, Ill.
Scherr Co., Geo., 128 Lafayette St., N. Y. C.
Segourney Tool Co., Hartford, Conn.
Stark Tool Co., Waltham, Mass.
Taylor and Fenn Co., Hartford, Conn.
Taylor Mfg. Corp., Milwaukee, Wis.
Toledo General Mfg. Co., 3620 Summitt Ave., Toledo
Walker-Turner Co., Inc., 639 South Ave., Plainfield, N. J.

DRILLING MACHINES, Travelling Base
American Tool Works Co., Cincinnati, Ohio
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Dreses Machine Tool Co., 3366 Beekman St., Cincinnati, Ohio
Fosdick Machine Tool Co., Blue Rock & Apple Sts., Cincinnati, Ohio

DRILLING MACHINES, Turret
Goss & deLeeuw Machine Co., New Britain, Conn.
Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Partool Mach. Co., 9111 Schaefer Rd., Detroit

DRILLING MACHINES, Upright Multiple Spindle
Automatic Machine Co., Bridgeport, Conn.
Avey Drilling Machine Co., Cincinnati, Ohio
Baker Bros. Inc., Toledo, Ohio
Barnes Drill Co., Rockford, Ill.
W. F. & John Barnes Co., Rockford, Ill.
Baush Machine Tool Co., 15 Wason Ave., Springfield, Mass.
Bryant Machinery and Engineering Co., 400 W. Madison St., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Buhr Machine Tool Co., Ann Arbor, Mich.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Cleereman Mach. Tool Co., Green Bay, Wis.
Consolidated Machine Tool Corp., Rochester
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Defiance Machine Works, Defiance, Ohio
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Ex-Cell-O Corp., Detroit, Mich.
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Grant Mfg. and Machine Co., Bridgeport, Conn.
Greenlee Bros. and Co., Rockford, Ill.
Hamilton Tool Co., Hamilton, O.
High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Langelier Mfg. Co., Cranston, R. I.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.

WHERE-TO-BUY DIRECTORY

DRILLING MACHINES, Upright Multiple
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Rockford Drilling Machine Co., Rockford, Ill.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Sigourney Tool Co., Hartford, Conn.
Taylor and Fenn Co., Hartford, Conn.

DRILLING MACHINES, Vertical
Allen Co., Chas. G., Barre, Mass.
Avey Drilling Machine Co., Inc., Cincinnati, Ohio
Baker Bros. Inc., Toledo, Ohio
Barnes Drill Co., Rockford, Ill.
W. F. & John Barnes Co., Rockford, Ill.
Baush Machine Tool Company, 156 Wason Ave., Springfield, Mass.
Boice Crane Co., Toledo, Ohio
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Bryant Machinery and Engrg. Co., 400 W. Madison St., Chicago, Ill.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Cleereman Machine Tool Co., Green Bay, Wis.
Consolidated Machine Tool Corp., Rochester, N. Y., Colburn Div.)
Defiance Machine Works, Defiance, Ohio
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Edlund Machry. Co., Cortland, N. Y.
Foote-Burt Co., Cleveland, Ohio
Green Bay Barker Mach. & Tool Wks., Green Bay, Wis.
Fosdick Machine Tool Co., Cincinnati, Ohio
Henry and Wright Mfg. Co., Hartford, Conn.
High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y.
Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Moline Tool Co., 102-20th St., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Partool Mach. Co., 9111 Schaefer Rd., Detroit
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Ryerson & Son, Inc., Jos. T., 16th & Rockwell Sts., Chicago, Ill.
Taylor and Fenn Co., Hartford, Conn.

DRILLS, Bit Stock
Cleveland Twist Drill Co., Cleveland, Ohio
Crucible Steel Co. of America, New York
Greenfield Tap and Die Corp., Greenfield, Mass.
Jessop Steel Co., Washington, Pa.
Morse Twist Drill and Machine Co., New Bedford, Mass.
National Twist Drill and Tool Co., Detroit
Standard Tool Co., Cleveland, Ohio
Timken Roller Bearing Co., Canton, Ohio
Union Twist Drill Co., Athol, Mass.

DRILLS, Center
Carboloy Co., Inc., Detroit, Mich.
Cleveland Twist Drill Co., Cleveland, Ohio
Firth-Sterling Steel Co., McKeesport, Pa.
Greenfield Tap and Die Corp., Greenfield, Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
National Twist Drill and Tool Co., Detroit, Mich.
Pratt & Whitney Co., Div. Niles-Bement-Pond Co., 486 Capitol Ave.
Slocomb Co., J. T., Providence, R. I.
Standard Tool Co., Cleveland, Ohio
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Tungsten Carbide Tool Co., Detroit
Union Twist Drill Co., Athol, Mass.

DRILLS, Core
Carboloy Co., Inc., Detroit, Mich.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Firth-Sterling Steel Co., McKeesport, Pa.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Morse Twist Drill and Machine Co., New Bedford, Mass.
Natoinal Twist Drill and Tool Co., Detroit
Production Tool Co., Detroit, Mich.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Tungsten Carbide Tool Co., Detroit
Union Twist Drill Co., Athol, Mass.

DRILLS, Flat
Groebert File Corp. of Amer., 3 Park Pl., N. Y.C.

DRILLS, Portable Electric
Black and Decker Mfg. Co., Towson, Md.
Buckeye Portable Tool Co., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Cincinnati Electrical Tool Co., Madison and Edwards Rds., Cincinnati, Ohio
James Clark, Jr., Elec. Co., 600 Bergman St., Louisville, Ky.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Independent Pneumatic Tool Co., Chicago, Ill.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio
Ryerson & Son, Inc., Jos T., 2558 W. 16th St., Chicago, Ill.
Savage Co., W. J., Knoxville, Tenn.
Signal Electric Mfg. Co., Menominee, Mich.
Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill.

DRILLS, Portible Electric (Continued)
Speedway Mfg. Co., Cicero, Ill.
Standard Electrical Tool Co., Cincinnati, Ohio
Stanley Elec. Tool Div. of Stanley Works, New Britan, Conn.
U. S. Electrical Tool Co., 2489 W. Sixth St., Cincinnati, Ohio
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

DRILLS, Pneumatic
Buckeye Portable Tool Co., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland
Helwig Mfg. Co., St. Paul, Minn.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio
Savage Co., W. J., Knoxville, Tenn.
Schramm Inc., West Chester, Pa.
Sullivan Machinery Co., Michigan City, Ind.

DRILLS, Ratchet
Armstrong Bros., Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cleveland Twist Drill Co., Cleveland, Ohio
Greenfield Tap and Die Corp., Greenfield, Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

DRILLS, Stone
American Swiss File & Tool Co., 400 Trumbull St., Elizabeth, N. J.

DRILLS, Twist and Flat
Amercan Twist Drill & Tool Co., 14301 W. Chicago Blvd., Detroit, Mich.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Cleveland Twist Drill Co., Cleveland, Ohio
Firth-Sterling Steel Co., McKeesport, Pa.
Greenfield Tap and Die Corp., Greenfield, Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
National Twist Drill and Tool Co., Detroit
Pratt & Whitney Div. Niles-Bennet-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., Cleveland, Ohio
Tungsten Carbide Tool Co., Detroit
Union Twist Drill Co., Athol, Mass.

DRIVES, Roller Chain (see Chain, Roller)

DRIVES, Silent Chain (see Chain Drives)

DRIVES, V-Belt
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Dayton Rubber Mfg. Co., Dayton, Ohio
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., Denver, Colo.
B. F. Goodrich Co., 576 South Main St., Akron, Ohio

DRIVES, Variable Speed Motor (see Transmissions, Variable Speed)

DROP HAMMERS (see Hammers, Drop)

DRUMS, Magnetic
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

DRYERS, Centrifugal
Barrett Co., Leon J., Worcester, Mass.

DRYING MACHINES
American Mach. & Metals, Inc., 100 6th Ave., N. Y. C.
Blakeslee & Co., G. S., Cicero Sta., Chicago
Metalwash Machinery Co., Inc., 117 E. 24th St., N. Y. C.

DUPLICATING MACHINES
George Gorton Machine Co., Racine, Wis.
Preis Engraving Mach. Co., H. P., 155 Summit St., Newark, N. J.
Thomas Machine Mfg. Co., Pittsburgh, Pa.

DUST ARRESTORS
Abrasive Machine Tool Co., East Providence, R. I.
American Foundry Equipment Co., Mishawaka, Ind.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Pangborn Corporation, Hagerstown, Md.

DUST COLLECTORS
American Foundry Equipment Co., Mishawaka, Ind.
Binks Mfg. Co., 3114 Carroll Ave., Chicago
Pangborn Corporation, Hagerstown, Md.
Whiting Corp., Harvey, Ill.

DYNAMIC BALANCING MACHINES (see Balancing Machines)

DYNAMOMETERS, Hydraulic
Taylor Mfg. Corp., Milwaukee, Wis.
Vickers, Inc., Detroit, Mich.

ELECTRIC HEATING ELEMENTS
American Foundry Equipment Co., Mishawaka, Ind.
Cutler Hammer, Inc., 315 N. 12th St., Milwaukee, Wis.
Driver-Harris Co., Harrison, N. J.
Electric Air Heater Co., Div. of American Fdry. Equip. Co., Mishawaka, Ind.
Hevi-Duty Electric Co., 4212 W. Highland Blvd., Milwaukee, Wis.
Hoskins Mfg. Co., Detroit, Mich.
Harold E. Trent Co., 618 N. 54th St., Philadelphia, Pa.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

ELECTRIC LIGHTING
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Fostoria Pressed Steel Corp., Fostoria, Ohio
General Electric Vapor Lamp Co., Hoboken, N. J.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

ELECTRICAL INSTRUMENTS
Bristol Co., Waterbury, Conn.
General Electric Co., Schenectady, N. Y.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Thing-Albert Instrument Co., 3337 Lancaster Ave., Philadelphia, Pa.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh

ELECTRICAL SUPPLIES
Arrow-Hart & Hegeman Elec. Co., 103 Hawthorne St., Hartford, Conn.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
General Electric Co., Schenectady, N. Y.
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

ELECTRODES, Welding
Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
Aluminum Co. of America, 2107 Gulf Bldg., Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
American Manganese Steel Div., 389 E. 14th St., Chicago Heights, Ill.
Electroloy Company, Inc., 30 Church St., N. Y. C.
Haynes-Stellite Co., Kokomo, Ind.
Lincoln Electric Co., Cleveland, Ohio
Linde Air Products Co., Inc., 30 E. 42nd St., New York, N. Y.
Lufkin Rule Co., Saginaw, Mich.
Metal & Thermit Corp., 120 Bway, N. Y. C.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Welding Timer Mfg. Co., 251 Ogden St., Newark, N. J.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

ELEVATORS, Portable
Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill.

ELEVATING AND CONVEYING MACHINERY (see Conveyors)

EMERY WHEELS (see Grinding Wheels)

ENAMELING RACKS
Driver-Harris Co., Harrison, N. J.

ENAMELERS, Centrifugal
American Manganese Steel Div., 389 E. 14th St., Chicago Heights, Ill.
Barrett Co., Leon J., Worcester, Mass.
Calorizing Co., Wilkinsburg Sta., Pittsburgh

ENAMELS
Bakelite Corp., Bound Brook, N. J.
Hague & Co., Inc., Alfred, 227-34th St., Brooklyn, N. Y.
Maas & Waldstein, Newark, N. J.
Roxalin Flexible Lacquer Co., Box A, Elizabeth, N. J.
Sherwin-Williams Co., 101 Prospect Ave., Cleveland

END MILLS (see Milling, Cutters)

ENGINES, Diesel
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Fairbanks Morse and Co., Chicago
General Machinery Corp., Hamilton, Ohio
Ingersoll-Rand Co., 11 Broadway, N. Y.

ENGINES, Gasoline
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.

ENGRAVING MACHINES
Electro-Graphic Graver Co., Factories Bldg., Toledo, O.
George Gorton Machine Co., 1103 13th St., Racine, Wis.
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Marburg Bros., Inc., 90 West St., N. Y. C.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Preis Engraving Machine Co., H. P., Newark, N. J.
Quality Merchandise Co., 2306 Lincolnwood Drive, Evanston, Ill.
Reed-Prentice Co., Worcester, Mass.

ENVELOPES & HOLDERS, Shop
Wade Instrument Co., 2246 Brooklyn Station, Cleveland, O.

ESCUTCHEONS
Crowe Name Plate and Mfg. Co., Chicago

EXHAUST ATTACHMENTS
Abrasive Machine Tool Co., East Providence, R. I.
Binks Mfg. Co., 3114 Carroll Ave., Chicago
Standard Electrical Tool Co., Cincinnati, Ohio

EXTRACTORS, Broken Tap
Walton Co., Hartford, Conn.

EXTRACTORS, Centrifugal
Barrett Co., Leon J., Worcester, Mass.

EXTRUDED SHAPES, Aluminum
Aluminum Co. of America, 2107 Gulf Bldg., Pittsburgh, Pa.

EXTRUDED SHAPES, Copper, Brass
American Brass Co., Waterbury, Conn.
Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.

WHERE-TO-BUY DIRECTORY

EYE BOLTS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Gisholt Machine Co., Madison, Wis.
Stark Tool Co., Waltham, Mass.

FACE PLATES & FACE PLATE JAWS
Brown & Sharpe Mfg. Co., Providence, R. I.
Skinner Chuck Co., New Britain, Conn.

FANS, Electric
Barber-Colman Company, Rockford, Ill.
Bendix Products Corp., South Bend, Ind.
Binks Mfg. Co., 3114 Carroll Ave., Chicago
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Diehl Mfg. Co., Elizabeth, N. J.
Emerson Electric Mfg. Co., 2001 Washington Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.
Savage Co., W. J., Knoxville, Tenn.
Signal Electric Mfg. Co., Menominee, Mich.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

FANS, Exhaust Ventilating (see Blowers and Fans)

FEED FINGERS (see Fingers, Feed)

FEEDS, Hydraulic for Machines
American Engineering Co., 2407 Aramingo Ave., Philadelphia, Pa.
Ex-Cell-O Tool Corp., Detroit
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Logansport Machine Co., Logansport, Ind.
Oilgear Co., 1403 W. Bruce St., Milwaukee
Vickers, Inc., 14010 Oakman Blvd., Detroit

FELT, all kinds
Booth Felt Co., 477 19th St., Brooklyn, N. Y.
Felters Co. Inc., South St., Boston, Mass.

FENCING
American Steel & Wire Co., Sub of U. S. Steel Co., Chicago, Ill.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.

FILE CARDS & BRUSHES
Disston & Sons, Inc., Henry, Tacony, Phila.

FILES AND RASPS
Atkins and Co., E. C., Indianapolis, Ind.
Delta File Works, Philadelphia, Pa.
Disston & Sons, Inc., Henry, Tacony, Phila.
Ford Co., M. A., Davenport, Iowa
Grafton Bros., Grafton, Wis.
Grob Bros., Grafton, Wis.
Grobet File Corp. of America, 3 Park Place, New York N. Y.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Marburg Bros., Inc., 90 West St., New York
Nicholson File Co., Providence, R. I.
Oliver Instrument Co., Adrian, Mich.
Stow Mfg. Co., Inc., 443 State St., Binghamton, N. Y.
Strand Co., N. A., 5001 N Lincoln St., Chicago

FILES, Coil
E. C. Atkins and Co., 402 S. Illinois St., Indianapolis, Ind.
Disston & Sons, Inc., Henry, Tacony, Phila.
Nicholson File Co., Providence, R. I.

FILES, Swiss Pattern
American Swiss File & Tool Co., 410 Trumbull St., Elizabeth, N. J.
Disston & Sons, Inc., Henry, Tacony, Phila.
Grobet File Corp. of Amer., 3 Park Pl., N. Y. C.
Index Machinery Corp., 49 Central Ave., Cincinnati, O.
Nicholson File Co., Providence, R. I.

FILING MACHINES
Armglo Co., Milwaukee, Wis.
Atkins and Co., E. C., Indianapolis, Ind.
Brickner-Kropf Mach. Co., Muskegon Heights, Mich.
Cocrane-Bly Co., Rochester, N. Y.
Continental Mach. Spec., Inc., Minneapolis
Disston & Sons, Inc., Henry, Tacony, Phila.
Grob Bros., Grafton, Wis.
Harvey Mfg. Co., 210 Center St., N. Y. C.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Jarvis Co., Chas. L., Middletown, Conn.
Marburg Bros., Inc., 90 West St., New York
Oliver Instrument Co., Adrian, Mich.
Oliver Machinery Co., Grand Rapids, Mich.
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.

FILING MACHINES, Rotary
Strand & Co., N. A., 5001 N. Wolcott Ave., Chicago

FILTERS, Air
Amer. Air Filter Co., 333 Central Ave., Louisville, Ky.
Binks Mfg. Co., 3114 Carroll Ave., Chicago
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland
Felters Co., Inc., 210 South St., Boston
Marshalltown Mfg. Co., Marshalltown, Iowa
Mine Safety Appliance Co., Braddock St., Pittsburgh

FILTERS, for Cutting Compounds
Cuno Engineering Co., Meriden, Conn.
Felters Co., Inc., 210 South St., Boston
Fostoria Pressed Steel Corp., Fostoria, Ohio
Motor Improvements, Inc., 365 Frelinghuysen Ave., Newark, N. J.

FILTERS, for Fuel Oil
Cuno Engineering Co., Meriden, Conn.
Felters Co., Inc., 210 South St., Boston
Motor Improvements, Inc., 365 Frelinghuysen Ave., Newark, N. J.

FILTERS, for Fuel Oil (Continued)
North American Mfg. Co., 2910 E. 75 St., Cleveland, Ohio
T. Shriver & Co., 888 Hamilton St., Harrison, N. J.

FILTERS, for Lubricants
Cuno Engineering Co., Meriden, Conn.
Felters Co., Inc., South St., Boston, Mass.
Motor Improvements, Inc., 365 Frelinghuysen Ave., Newark, N. J.
T. Shriver & Co., 888 Hamilton St., Harrison, N. J.

FINGERS, Feed
Eastern Machine Screw Corp., New Haven, Conn.
Davenport Machine Tool Co., Inc., 167 Ames St., Rochester, N. Y.
Hardinge Brothers, Inc., Elmira, N. Y.
Index Machinery Corp., 49 Central Ave., Cincinnati, O.
Mitts and Merrill, Saginaw, Mich.
Morrison Machine Prod. Div., Elmira, N. Y.
Rivett Lathe and Grinder Co., Inc., Brighton, Boston, Mass.

FITTINGS, Pipe
Dresser Mfg. Co., S. R. Bradford, Pa.

FITTINGS, Wire Rope
American Steel and Wire Co., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Williams & Co., J. H., Spring St., New York

FLAME CUTTING MACHINES
Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York, N. Y.
Ryerson and Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

FLANGED UNIONS
Aluminum Company of America, Pittsburgh
Dart Mfg. Co. E. M., Providence, R. I.
Elmes Engineering Works, Chas. F., 1001 Fulton St., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Watson-Stillman Co., Roselle, N. J.

FLASKS, Foundry
American Foundry Equipment Co., Mishawaka, Ind.
Consolidated Mach. Tool Corp., Rochester (Hilles & Jones Div.)

FLEXIBLE COUPLINGS
(See Couplings, Flexible)

FLEXIBLE-SHAFT EQUIPMENT
Dumore Company, Racine, Wis.
Errington Mechanical Laboratory, Stapleton, Staten Island, N. Y.
Haskins Co., R. G., 4630 West Fulton St., Chicago, Ill.
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Jarvis Co., Charles L., Middletown, Conn.
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Stow Mfg. Co., 443 State St., Binghamton, N. Y.
Strand Co., N. A., 5001 N. Lincoln St., Chicago
Swartz & White Mfg. Co., 215 Washington St., Binghamton, N. Y.
U. S. Electrical Tool Co., 2489 W. 6th St., Cincinnati, O.
Walker-Turner Co. Inc., 639 South Ave., Plainfield, N. J.
White Dental Mfg. Co., S. S., 10 E. 40th St., N. Y. C.

FLOOD LIGHTS
Benjamin Elec. Mfg., Des Plaines, Ill.
Curtis Lighting, Inc., 1223 W. Jackson Blvd., Chicago, Ill.
Keckley Co., O. C., 567 Washington Blvd., Chicago
Mine Safety Appliance Co., Braddock St., Pittsburgh
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

FLOOD LIGHTS, Acetylene
Linde Air Products Co. Inc., 30 E. 42nd St., New York, N. Y.
National Carbide Corp., Lincoln Bldg., N. Y. C.

FLOOR STANDS, Bar Type
Campbell, Andrew C., (Division Am. Chain & Cable Co.), Bridgeport, Conn.
Frick-Gallagher Mfg. Co., Wellston, Ohio

FOOT PRESSES (see Presses, Foot)
American Gas Furnace Co., Elizabeth, N. J.
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, N. Y.
Charles A. Hones, Inc., 121 S. Rand Ave., Baldwin, N. Y.
Perkins Machine Co., Warren, Mass.

FORGING MACHINERY
Acme Machinery Co., Cleveland, Ohio
Ajax Mfg. Co., Cleveland, Ohio (Euclid Branch P. O.)
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Bliss Co., E. W., 53rd St. and 2nd Ave., N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes Engrg. Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Keckley Co., O. C., 567 Washington Blvd., Chicago
Lake Erie Engrg Corp. Kenmore Sta., Buffalo
Manville Co., E. J., Waterbury, Conn.

FORGING MACHINERY (Continued)
Mesta Machine Co., P. O. Box 1466, Pittsburgh
National Machinery Co., Tiffin, Ohio
Watson-Stillman Co., Roselle, N. J.
Wood Company, R. D., Philadelphia, Pa.

FORGING ROLLS
Ajax Mfg. Co., Cleveland, Ohio (Euclid Branch P. O.)
Williams, White & Co., Moline, Ill.

FORGINGS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bonney Forge & Tool Works, Allentown, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Endicott Forging & Mfg. Co., Inc., Endicott, N. Y.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Jessop Steel Co., Washington, Pa.
Latrobe Electrical Steel Co., 2626 Ligonier St., Latrobe, Pa.
Lempco Products, Inc., Dunham Road, Bedford, Ohio
Ludlum Steel Co., Watervliet, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Prosser and Sons, Thos., 120 Wall St., N. Y. C.
Revere Copper & Brass, Inc., 230 Park Ave., New York, N. Y.

FORGINGS, Aluminum
Aluminum Co. of America, Pittsburgh, Pa.

FORGINGS, Copper, Brass and Bronze
American Brass Co., Waterbury, Conn.
Revere Copper and Brass Corp., 230 Park Ave., New York, N. Y.

FORGINGS, Drop
Endicott Forging & Mfg. Co. Inc., Endicott, N. Y.
Seamless Prod. Co., Inc., 113 W. 42nd St., N. Y. C.

FORGINGS, Hollow Bored
American Hollow Boring Co., 19th and Raspberry Sts., Erie, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Seamless Steel Equipment Corp., 39 Broadway, New York City

FORMING AND BENDING MACHINES
Ajax Manufacturing Co., Euclid Branch P. O., Cleveland, Ohio
Chambersburg Engineering Co., Chambersburg, Pa.
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch and Shear Works Co., Cleveland, Ohio
Consolidated Mach. Tool Corp., Rochester (Hilles & Jones Div.)
Elmes Engrg. Works, Chas. F., 1001 Fulton St., Chicago, Ill.
Farrel-Birmingham Co. Inc., Ansonia, Conn.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co. Mt. Gilead, Ohio
Keckley Co., O. C., 567 Washington Blvd., Chicago
Marburg Bros., Inc., 90 West St., New York
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Niagara Machine and Tool Works, Buffalo
Peck, Stow & Wilcox Co., Southington, Conn.
Robertson Co., John, 121 Water St., Bklyn, N. Y.
Ryerson and Co. Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Schatz Mfg. Co., Poughkeepsie, N. Y.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Whitney Metal Tool Co., Rockford, Ill.
Williams, White & Co., Moline, Ill.

FOUNDRY FLASKS (see Flasks, Foundry)

FOUNDRY HANDLING EQUIPMENT
All Steel Welded Truck Corp., 1139 Railroad Ave., Rockford, Ill.
American Engineering Co., Philadelphia, Pa.
American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind.
American Mono-Rail Co., 13113 Athens Ave., Cleveland, Ohio
Baker-Raulang Co., Cleveland, Ohio
Clark Equip. Co., Battle Creek, Mich.
Cleveland Crane and Engineering Co., Wickliffe, Ohio
Elwell-Parker Electric Co., 4511 St. Clair Ave., Cleveland, Ohio
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio
Tabor Mfg. Co., 6225 Tacony St., Philadelphia
Powell Pressed Steel Co., Hubbard, Ohio
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Yale and Towne Mfg. Co., Philadelphia Div., Philadelphia, Pa

FOUNDRY JACKETS (see Jackets, Foundry)

FOUNDRY SAND AND MOLD HANDLING EQUIPMENT
American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind.
Link-Belt Co., 300 W. Pershing Rd., Chicago
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio

FRICTION PULLEYS
Brown and Sharpe Mfg. Co., Providence, R. I.
Continental Diamond Fibre Co., Newark, Del.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Hendey Machine Co., Torrington, Conn.
Johnson Machine Co., Carlyle, 52 Main St., Manchester, Conn.
Link-Belt Co., 2410 W. 18th St., Chicago
Power Transmission Council, 74 State St., Boston, Mass.

WHERE-TO-BUY DIRECTORY

FUEL OIL
Gulf Refining Co., Pittsburgh, Pa.
Motor Improvements, Inc., 365 Frelinghuysen Ave., Newark, N. J.
Socony-Vacuum Oil Co., New York, N. Y.
Standard Oil Co. of Indiana, Chicago, Ill.
Texas Co., The, New York, N. Y.
Tidewater Associated Oil Co., 17 Battery Pl., New York, N. Y.

FURNACES, Combustion Analysis
Sentry Co., Foxboro, Mass.

FURNACES, Electric
Bellis Heat Treating Co., Branford, Conn.

FURNACES, Heat Treating, Tempering and Annealing
Ajax Electrothermic Corp., Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Baker and Co., Inc., 54 Austin St., Newark, N. J.
Bellis Heat Treating Co., Branford, Conn.
Despatch Oven Co., 622 9th St. S. E., Minneapolis
Eclipse Fuel Engrg. Co., 701 S. Main St., Rockford, Ill.
Electric Furnace Co., W. Wilson St., Salem, Ohio
Firth-Stirling Steel Co., McKeesport, Pa.
Gas Machinery Co., 16100 Waterloo Rd., Cleveland, Ohio
General Electric Co., Schenectady, N. Y.
Hayes Co., C. I., Providence, R. I.
Heavi-Duty Electric Co., 4212 W. Highland Blvd., Milwaukee, Wis.
Holcroft & Co., Detroit, Mich.
Charles A. Hones, Inc., 121 S. Rand Ave., Baldwin, N. Y.
Hoskins Mfg. Co., Detroit, Mich.
Ingersoll-Rand Co., 11 Broadway, New York
C. M. Kemp, Baltimore, Md.
Leeds and Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., 221 N. Laflin St., Chicago, Ill.
National Gas Furnace Co., 112 Point St., Providence, R. I.
Rockwell Co., W. S., 50 Church St., N. Y. C.
Sentry Co., Foxboro, Mass.
Stark Tool Co., Waltham, Mass.
Strong, Carlisle and Hammond Co., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio
Swoboda, Inc., H. O., 4201 Main St., Pittsbugrh
Trent Co., Harold E., 618 N. 54th St., Phila.
Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.

FURNACES, Soldering
Sentry Co., Foxboro, Mass.

FURNITURE, Factory
Wallace Supplies Mfg. Co., 13110 Diversey Pkway., Chicago

FURNITURE, Machine Shop
General Fireproofing Co., Youngstown, Ohio
Standard Pressed Steel Co., Jenkintown, Pa.
Western Tool and Mfg. Co., Springfield, Ohio
Whistler and Sons, S. B. Inc., Buffalo, N. Y.

FUSES, Electric
General Electric Co., Schenectady, N. Y.
Jefferson Electric Co., Bellwood, Ill.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

GAGE BLOCKS
Dearborn Gage Co., 22036 Beach St., Dearborn, Mich.

GAGES, Caliper
Brown and Sharpe Mfg. Co., Providence, R. I.
Federal Products Corp., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.
L. S. Starrett Co., Crescent St., Athol, Mass.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Williams Co., J. H., 75 Spring St., N. Y.

GAGES, Comparator
Ames Co., B. C., Waltham, Mass.
Federal Products Corp., Providence, R. I.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Marburg Bros., Inc., 90 West St., New York
Mico Instrument Co., 10 Arrow Street, Cambridge, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Starrett Co., The L. S., Athol, Mass.
Swedish Gage Co. of America, 7310 Woodward Ave., Detroit, Mich.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Triplex Mach. Tool Corp., 125 Barclay St., N. Y. C.
Van Keuren Company, The, Watertown, Mass.

GAGES, Depth
Brown and Sharpe Mfg. Co., Providence, R. I.
Chicago Dial Indicator Co., 180 No. Wacker Drive, Chicago
Federal Products Corp., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.
Marsh Corp., Jas P., 2073 Southport Ave., Chicago
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Starrett Co., The L. S., Athol, Mass.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Vinco Tool Co., Detroit, Mich.

GAGES, Dial
Ames Co., B. C., Waltham, Mass.
Chicago Dial Indicator Co., 180 No. Wacker Drive, Chicago
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Federal Products Corp., Providence, R. I.
Index Machinery Corp., 49 Central Ave., Cincinnati, O.
Randall & Stickney, Waltham, Mass.
Starrett Co., L. S., Athol, Mass.
Taft-Peirce Mfg. Co., Woonsocket, R. I.

GAGES, Drill, Grinding
Morse Twist Drill & Mach. Co., New Bedford, Mass.

GAGES, Plug and Ring, Cemented Carbide
Carboloy Co., Inc., Detroit, Mich.
Crafts Co., Inc., Arthur A., 532 Commonwealth Ave., Boston, Mass.
Michigan Tool Co., Detroit
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Tungsten Carbide Tool Co., Detroit
Wilkening Mfg. Co., 2000 S. 71st st., Phila.

GAGES, Pressure
Brown Instrument Co., Phila., Pa.

GAGES, Profile
Pratt & Whitney Div. Niles-Bement-Pond, 436 Capitol Ave., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Van Keuren Co., Watertown, Mass.
Vinco Tool Co., Detroit, Mich.

GAGES, Recording
Bristol Co., Waterbury, Conn.
Brown Instrument Co. (A Div. of Minneapolis-Honewell Reg. Co.), 405 Wayne Ave., Phila.
Federal Products Corp., Providence, R. I.
Foxboro Company, 122 Neponset Ave., Foxboro, Mass.
Leeds and Northrup Co., Philadelphia, Pa.
Marsh Corp., Jas P., 2073 Southport Ave., Chicago
C. J. Tagliabne Mfg. Co., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford, Conn.

GAGES, Snap Plug, and Cylindrical
Brown and Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Crafts Co., Inc., Arthur A., 532 Commonwealth Ave., Boston, Mass.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Federal Products Corp., Providence, R. I.
Greenfield Tap and Die Corp., Greenfield, Mass.
Michigan Tool Co., Detroit
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
George Scherr Co., Inc., 128 Lafayette St., New York City
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Swedish Gage Co., of America, 7310 Woodward Ave., Detroit, Mich.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Van Keuren Co., Watertown, Mass.
Vinco Tool Co., Detroit, Mich.
J. H. Williams Co., 75 Spring St., N. Y.

GAGES, Taper Pin
Morse Twist Drill & Mach. Co., New Bedford, Mass.

GAGES, Temperature
Brown Instrument Co., Phila., Pa.

GAGES Thickness
Ames Co., B. C., Waltham, Mass.
Brown and Sharpe Mfg. Co., Providence, R. I.
Ford Motor Co., Johansson Div., 3674 Schaefer Road, Dearborn, Mich.
Federal Products Corp., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Randall and Stickney Co., Waltham, Mass.
George Scherr Co., Inc., 128 Lafayette St., New York City
Sheffield Gage Co., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Starrett Co., L. S., Athol, Mass.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Van Keuren Co., Watertown, Mass.
Vinco Tool Co., Detroit, Mich.

GAGES, Thread
John Bath and Co., Inc., Worcester, Mass.
Brown and Sharpe Mfg. Co., Providence, R. I.
Colonial Broach Company, Detroit, Mich.
Detroit Tap and Tool Co., Detroit, Mich.
Federal Products Corp., Providence, R. I.
Greenfield Tap and Die Corp., Greenfield, Mass.
Hanson-Whitney Machine Co., Hartford, Conn.
Lufkin Rule Co., Saginaw, Mich.
Michigan Tool Co., Detroit, Mich.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
George Scherr Co., Inc., 128 Lafayette St., New York City
Sheffield Gage Corp., Dayton, Ohio
Starrett Co., The L. S., Athol, Mass.
Taft-Peirce Mfg. Co., Woonsocket, R. I.

GAGES, Wire
E. C. Atkins & Co., 402 S. Illinois St., Indianapolis, Ind.
Disston and Sons, Inc., Henry, Tacony, Phila.
Federal Products Corp., 1144 Eddy St., Providence, R. I.
Starrett Co., L. S., Crescent St., Athol, Mass.

GALVANIZING EQUIPMENT
Koven & Bros., Inc., L. O., Jersey City, N. J.
Meaker Company, 1629 S. 55th Ave., Chicago, Ill.

GASKETS
Colt's Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., Hartford, Conn.
Continental Diamond Fibre Co., Newark, Del.
Felters Co. Inc., South St., Boston, Mass.
Gates Rubber Co., Denver, Colo.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Graton and Knight Co., Worcester, Mass.
Johns-Manville, 22 E. 42nd St., N. Y. C.

GASOLINE
Gulf Refining Co., Pittsburgh, Pa.
Socony-Vacuum Oil Co., Inc., N. Y. C.
Standard Oil Co., of Indiana, Chicago, Ill.
Sun Oil Company, Philadelphia, Pa.
Texas Company, The, New York, N. Y.
Tidewater Associated Oil Co., 17 Battery Place, New York

GATES, Fence
American Steel & Wire Co., Sub. of U. S. Steel Co., Chicago, Ill.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.

GEAR BLANKS, Bronze
American Brass Co., Waterbury, Conn.
Ampco Metal Co., Milwaukee, Wis.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, O.
Earle Gear & Mach. Co., 4707 Stenton Ave. Philadelphia, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York, N. Y.

GEAR BLANKS, Composition
Bakelite Corp., Bound Brook, N. J.
Bilgram Gear and Machine Works, Phila.
Cincinnati Gear Company, Cincinnati, Ohio
Continental Diamond Fibre Co., Newark, Delaware
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
Grant Gear Works, Inc., South Boston, Mass.
Savage Co., W. J., Knoxville, Tenn.
Synthane Corp., Oaks, Pa.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

GEAR BLANKS, Laminated Steel
Ajax Electric Co., Frankford Ave. and Allen St., Philadelphia, Pa.
Bilgram Gear and Machine Works, Phila., Pa.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Ganschow Gear Co., 1007 W. Washington Blvd., Chicago, Ill.
Grant Gear Works, Inc., South Boston, Mass.
Waldron Corp., John, New Brunswick, N. J.

GEAR BLANKS, Steel, Drop Forged
Endicott Forging & Mfg. Co. Inc., Endicott, N. Y.

GEAR BURNISHING MACHINES
Cimatool Co., Dayton, Ohio
Colonial Broach Co., Detroit, Mich.
Detroit Tap and Tool Co., Detroit, Mich.
Fellows Gear Shaper Co., Springfield, Vt.
Gleason Works, Rochester, N. Y.
Michigan Tool Co., Detroit, Mich.
National Broach Machine Co., 11455 Shoemaker Ave., Detroit, Mich.

GEAR CUTTING
Bilgram Gear & Machine Works, 1223 Spring Garden St., Phila., Pa.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo
Hartford Spec. Machry. Co., Hartford, Conn.
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.
Taylor Machine Co., 1917 E. 61st St., Cleveland, Ohio

GEAR CUTTING MACHINES
Adams Co., Dubuque, Iowa
Barber-Colman Co., Rockford, Ill.
Bilgram Gear and Machine Works, Phila., Pa.
Brown and Sharpe Mfg. Co., Providence, R. I.
Cleveland Hobbing Mach. Co., Cleveland, O.
Cross Gear and Machine Co., Detroit, Mich.
R. M. Clough, Meriden, Conn.
Detroit Tap and Tool Co., Detroit, Mich.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo
Fellows Gear Shaper Co., Springfield, Vt.
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Gleason Works, Rochester, N. Y.
Gould and Eberhardt, Irvington, N. J.
Lees Bradner Co., Cleveland, Ohio
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Philadelphia Gear Works, Erie Ave. & G St., Phila.
Producto Machine Co., Bridgeport, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Waltham Machine Works, Waltham, Mass.

WHERE-TO-BUY DIRECTORY

GEAR CUTTING MACHINES, Bevel (Generator and Template Planer)
Bilgram Gear and Machine Works, Phila.
Colonial Broach Co., Detroit, Mich.
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Gleason Works, Rochester, N. Y.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

GEAR CUTTING MACHINES, Bevel and Spur (Rotary Cutter)
Brown and Sharpe Mfg. Co., Providence, R. I.
Gleason Works, Rochester, N. Y.
Gould and Eberhardt, Irvington, N. J.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Producto Machine Co., Bridgeport, Conn.
Triplex Mach. Tool Corp., 125 Barclay St., N. Y. C.

GEAR CUTTING MACHINES, Helical and Spur (Hob)
Adams Co., Dubuque, Iowa
Barber-Colman Co., Rockford, Ill.
Brown and Sharpe Mfg. Co., Providence, R. I.
Gould and Eberhardt, Irvington, N. J.
Lees-Bradner Co., Cleveland, Ohio
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Triplex Mach. Tool Corp., 125 Barclay St., N. Y. C.

GEAR CUTTING MACHINES, Helical and Spur (Shaper or Planer Type)
Cleveland Hobbing Mach. Co., Cleveland, Ohio
Cross Gear and Machine Co., Detroit, Mich.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo
Fellows Gear Shaper Co., Springfield, Vt.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Triplex Mach. Tool Corp., 125 Barclay St., N. Y. C.

GEAR CUTTING MACHINES Spiral, Bevel, and Hypoid-Gear Generating
Gleason Works, Rochester, N. Y.

GEAR CUTTING MACHINES, Worm and Worm Wheel (Hob)
Adams Co., Dubuque, Iowa
Barber-Colman Co., Rockford, Ill.
Cleveland Hobbing Machine Co., E. 152nd St., Cleveland, Ohio
Gould and Eberhardt, Irvington, N. J.
Lees-Bradner Co., Cleveland, Ohio
Michigan Tool Co., Detroit, Mich.
Producto Machine Co., Bridgeport, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

GEAR LAPPING MACHINES
American Tool Works Co., Cincinnati, Ohio
Colonial Broach Co., Detroit, Mich.
Detroit Tap and Tool Co., Detroit, Mich.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Fellows Gear Shaper Co., Springfield, Vt.
Gleason Works, Rochester, N. Y.
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.
Marburg Bros., Inc., 90 West St., New York
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.

GEAR MEASURING MACHINES
Colonial Broach Co., Detroit, Mich.
Detroit Tap and Tool Co., Detroit, Mich.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Fellows Gear Shaper Co., Springfield, Vt.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Lees-Bradner Co., Cleveland, Ohio
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Triplex Mach. Tool Corp., 125 Barclay St., N. Y. C.
Van Keuren Co., 12 Copeland St., Watertown, Mass.

GEAR MOTORS (see Speed Reducers, Motorized)

GEAR TEMPERING MACHINES
Gleason Works, Rochester, N. Y.

GEAR TESTING MACHINES
Brown and Sharpe Mfg. Co., Providence, R. I.
Colonial Broach Co., Detroit, Mich.
Detroit Tap and Tool Co., Detroit, Mich.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Fellows Gear Shaper Co., Springfield, Vt.
Gleason Works, Rochester, N. Y.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Lees-Bradner Co., Cleveland, Ohio
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

GEAR TOOTH ROUNDING MACHINES
Cimatool Co., Dayton, Ohio
Consolidated Machine Tool Corp., Rochester
Cross Gear and Machine Co., Detroit, Mich.
Lipe, Inc., W. C., 208 S Geddes St., Syracuse

GEARS
Bilgram Gear & Machine Works, 1223 Spring Garden St., Phila., Pa.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo
Link Belt Co., 2410 W. 18th St., Chicago, Ill.
Philadelphia Gear Works, Erie Ave. & G St., Phila.
Taylor Machine Co., 1917 E. 61st St., Cleveland

GEARS, Burnishing
Fellows Gear Shaper Co., Springfield, Vt.
Illinois Tool Works, 2501 Keeler Ave., N., Chicago, Ill.
Michigan Tool Co., Detroit
National Tool Co., Cleveland, O.

GEARS, Cast
American Manganese Steel Div., 389 E. 14th St., Chicago Heights, Ill.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Clarksville Foundry & Machine Works, Commerce & Spring Sts., Clarksville, Tenn.
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Machine Co., Philadelphia
Farrel-Birmingham Co. Inc., Ansonia, Conn.
General Electric Co., Schenectady, N. Y.
Gerdes & Co., Inc., 36 Church St., New York
Grant Gear Works Inc., South Boston, Mass.
Link Belt Co., 2410 W. 18th St., Chicago, Ill.
Massachusetts Gear and Tool Co., Woburn, Mass.
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Ohio Gear Co., Cleveland, O.
Philadelphia Gear Works Inc., Philadelphia
Savage Co., W. J., Knoxville, Tenn.

GEARS, Cut
Adams Co., Dubuque, Iowa
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bilgram Gear & Machine Works, 1223 Spring Garden St., Phila., Pa.
Boston Gear Works, Inc., North Quincy, Mass.
Brown and Sharpe Mfg. Co., Providence, R. I.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Cincinnati Gear Co., Cincinnati, Ohio
Cincinnati Lathe and Tool Co., Oakley, Cincinnati, Ohio
Clarksville Foundry & Machine Works, Commerce & Spring Sts., Clarksville, Tenn.
Chas. E. Crofoot Gear Corp., South Easton, Mass.
DeLaval Steam Turbine Co., Trenton, N. J.
Earle Gear & Machine Co., Philadelphia
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Foote Bros. Gear & Mach. Corp., 5301 S. Western Blvd., Chicago, Ill.
Foote Gear Works, Cicero, Ill.
Ganschow Gear Co., 1007 W. Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2635 Canton St., Chicago
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Gerdes & Co., Inc., 36 Church St., New York
Gould and Eberhardt, Irvington, N. J.
Grant Gear Works Inc., South Boston, Mass.
Hartford Special Machinery Co., Hartford, Conn.
Horsburgh and Scott Co., Cleveland, Ohio
James Mfg. Co., D. O., Chicago, Ill.
Carlyle Johnson Machine Co., Manchester, Conn.
Lempco Products Inc., Dunham Road, Bedford, O.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Massachusetts Gear and Tool Co., Woburn, Mass.
Mechanical Specialties, Inc., 2635 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Mesta Machine Co., P. O. Box 1466, Pittsburgh
National Broach & Mach Co., Detroit, Mich.
National Erie Corp., Erie, Pa.
Ohio Gear Co., 1333 E. 179th St., Cleveland
Perkins Machine and Gear Co., Springfield, Mass.
Philadelphia Gear Works, Inc., Philadelphia
Savage Co., W. J., Knoxville, Tenn.
Sier-Bath Gear Co., New York, N. Y.
Slaysman and Co., 813 E. Pratt St., Baltimore
Winfield H. Smith, Inc., Springville, Erie County, N. Y.
Stahl Gear and Machine Co., Cleveland, Ohio
Taylor Machine Co., 1917 E. 61st St., Cleveland, Ohio
Vinco Tool Co., Detroit, Mich.
Westinghouse Elec. and Mfg. Co., East Pittsburg, Pa.

GEARS, Finished
National Broach & Mach Co., Detroit, Mich.

GEARS, Laminated Steel
Bilgram Gear and Machine Works, Phila., Pa.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Earle Gear & Machine Co., Philadelphia
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Foote Bros. Gear & Mach. Corp., 5301 S. Western Blvd., Chicago, Ill.
Foote Gear Works, Inc., 1301 South Cicero Ave., Cicero, Ill.

GEARS, Laminated Steel (Continued)
Ganschow Gear Co., 1007 W. Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2635 Canton St., Chicago, Ill.
Gerdes & Co., Inc., 36 Church St., New York
Grant Gear Works, Inc., South Boston, Mass.
Mechanical Specialties, Inc., 2335 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Slaysman and Co., 813 E. Pratt St., Baltimore
Stahl Gear and Machine Co., Cleveland, Ohio

GEARS, Master
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Fellows Gear Shaper Co., Springfield, Vt.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit
National Broach & Mach Co., Detroit, Mich.
National Tool Co., Cleveland, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Vinco Tool Co., 7350 Central Ave., Detroit

GEARS, Non-Metallic
Adams Co., Dubuque, Iowa
Bakelite Corporation, Bound Brook, N. J.
Bilgram Gear and Machine Works, Phila., Pa.
Boston Gear Works, Inc., North Quincy, Mass.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Cincinnati Gear Co., Cincinnati, Ohio
Clarksville Foundry & Machine Works, Commerce & Spring Sts., Clarksville, Tenn.
Continental Diamond Fibre Co., Newark, Del.
Chas. E. Crofoot Gear Corp., South Easton, Mass.
Earle Gear & Machine Co., Philadelphia
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Foote Bros. Gear & Mach. Corp., 5301 S. Western Blvd., Chicago, Ill.
Foote Gear Works, Inc., 1301 South Cicero Avenue, Cicero, Ill.
Formica Insulation Co., Cincinnati, O.
Ganschow Gear Co., 1007 W. Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2635 Canton St., Chicago
Gerdes and Co., 36 Church St., New York City
Grant Gear Works Inc., South Boston, Mass.
Hartford Special Machinery Co., Hartford, Conn.
Horsburgh and Scott Co., Cleveland, Ohio
James Mfg. Co., D. O., Chicago, Ill.
Massachusetts Gear and Tool Co., Woburn, Mass.
Mechanical Specialties Inc., 2635 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Ohio Gear Co., 1333 E. 179th St., Cleveland
Perkins Machine and Gear Co., Springfield, Mass.
Philadelphia Gear Works, Inc., Philadelphia
Savage Co., W. J., Knoxville, Tenn.
Slaysman and Co., 813 E. Pratt St., Baltimore, Md.
Winfield H. Smith, Inc., Springville, Erie County, N. Y.
Stahl Gear and Machine Co., The, Cleveland, O.
Synthane Corp., Oaks, Pa.
Taylor Machine Co., 1917 E. 61st St., Cleveland, Ohio
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

GENERATORS, Carbide, Acetylene
Air Reduction Sales Co., 60 E. 42nd St., N.Y.C.
Linde Air Products Co., 30 E. 42 St., N. Y. C.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

GENERATORS, Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Century Electric Co., 1806 Pine St., St. Louis
Diehl Mfg. Co., Elizabethport, N. J.
Fairbanks Morse and Co., 900 S. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Reliance Elec. & Engrg. Co., 1088 Idaho Road, Cleveland, Ohio
O. S. Walker Co. Inc., Worcester, Mass.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

GLUE HEATERS, Electric
Black & Decker Mfg. Co., Towson, Md.
Cutler Hammer, Inc., Milwaukee, Wis.
Francis Co., Chas. E., W. Fifth St., Rushville, Ind.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

GOGGLES, Safety
Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
American Optical Company, Southbridge, Mass.
Chicago Eye Shield Co., 2300 Warren Blvd., Chicago
Willson Products, Inc., Reading, Pa.

GRADUATING MACHINES
George Gorton Machine Co., 1103-13th St., Racine, Wisc.
Lufkin Rule Co., Saginaw, Mich.
Micro Instrument Co., 10 Arrow St., Cambridge, Mass.
Noble and Westbrook Mfg. Co., East Hartford, Conn.

GRAPHITE
Jos. Dixon Crucible Co., Jersey City, N. J.

GREASE
Jos. Dixon Crucible Co., Jersey City, N. J.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.

WHERE-TO-BUY DIRECTORY

GREASE (Continued)
Socony Vacuum Oil Co., Inc., New York, N. Y.
Standard Oil Company of Indiana, Chicago, Ill.
Stuart Oil Co., D. A., 2727 South Troy St., Chicago, Ill.
Sun Oil Co., Philadelphia, Pa.
Swan Finch Oil Corp., 30 Rockefeller Plaza, N. Y. C.
Texas Company, 135 E. 42nd St., New York
Tidewater Associated Oil Co., 17 Battery Place, N. Y.

GRINDERS, Hand
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Dumore Co., Racine, Wis.
Hammond Machinery Bldrs., Inc. Kalamazoo, Mich.
Hisey-Wolf Machine Co., Cincinnati, O.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Onsrud Mach. Works, Inc., 3921 Palmer St., Chicago
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, O.
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.

GRINDERS, Pneumatic
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City
Helwig Mfg. Co., St. Paul, Minn.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Company, 11 Broadway, New York, N. Y.
Savage Co., W. J., Knoxville, Tenn.

GRINDERS, Railway, Frog and Switch (Manufacturing)
Automatic Machine Co., Bridgeport, Conn.

GRINDING ATTACHMENTS, Pulley
Abrasive Machine Tool Co., E. Providence, R. I.
Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Lathe and Tool Co., Oakley, Cincinnati, Ohio
Diamond Machine Co., Providence, R. I.

GRINDING MACHINE ATTACHMENTS
Abrasive Machine Co., East Providence, R. I.
Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Grinders, Inc., Cincinnati, Ohio
Cullman Wheel Co., Chicago, Ill.
Diamond Machine Co., Providence, R. I.
Landis Tool Co., Waynesboro, Pa.
Norton Company, Worcester, Mass.
Thompson Grinder Co., The, Springfield, O.

GRINDING MACHINES, Abrasive Belt
Buckeye Portable Tool Co., Dayton, O.
Definance Machine Works, Definance, Ohio
Delta Mfg. Co., 600 E. Vienna Ave., Milwaukee, Wis.
Hammond Machinery Bldrs., Inc., Kalamazoo, Mich.
Mattison Machine Works, Rockford, Ill.
Oliver Machinery Co., Grand Rapids, Mich.
Porter Cable Machine Co., Syracuse, N. Y.
Pratt & Whitney Co., Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Machine Co., Greenfield, Mass.
Walker-Turner Co., Inc., 639 South Ave., Plainfield, N. J.
Walls Sales Corp., 96 Warren St., New York

GRINDING MACHINES, Bench
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Black and Decker Mfg. Co., Towson, Md.
Brown-Brockmeyer Co., Dayton, Ohio
Brown and Sharpe Mfg. Co., Providence, R. I.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Clark Jr. Elec. Co., James, 600 Bergman St., Louisville, Ky.
Cleveland Elec. Motor, 5213 Chester Ave., Cleveland, Ohio
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Diehl Mfg. Co., Elizabethport, N. J.
Forbes & Myers, 170 Union St., Worcester, Mass.
Hammond Machinery Bldrs., Inc., Kalamazoo, Mich.
Hisey-Wolf Machine Co., The, Cincinnati, O.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Marathon Elec. Mfg. Corp., Wausau, Wis.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Oliver Machinery Co., Grand Rapids, Mich.
Porter Cable Machine Co., Syracuse, N. Y.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Prosser and Sons, Thos., 120 Wall St., N. Y. C.
Ransom Grinding Machine Co., 320-326 Eighth St., Oshkosh, Wis.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.
Speedway Mfg. Co., Cicero, Ill.
Standard Electrical Tool Co., Cincinnati
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.
Stark Tool Co., Waltham, Mass.
Steege Mach. Co., Chicago, Ill.

GRINDING MACHINES, Bench (Continued)
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.
U. S. Electrical Motors Inc., Los Angeles, Calif.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, O.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.
Vonnegut Moulder Corp., 1819 Madison Ave., Indianapolis
Walker Co., O. S., Worcester, Mass.
Walker-Turner Co. Inc., 639 South Ave., Plainfield, N. J.

GRINDING MACHINES, Centerless
Cincinnati Grinders, Inc., Cincinnati, O.
Heald Machine Co., Worcester, Mass.
Production Machine Co., Greenfield, Mass.

GRINDING MACHINES, Chaser or Die
Consolidated Machine Tool Corp., Rochester, N. Y. (Modern Tool Wks)
Eastern Machine Screw Corp., New Haven, Conn.
Gallmeyer and Livingston Co., Grand Rapids
Geometric Tool Co., New Haven, Conn.
Landis Machine Co., Inc., Waynesboro, Pa.
Murcher Machine and Tool Co., Detroit, Mich.
National Acme Co., Cleveland, O.
National Machinery Co., Tiffin, Ohio
Rickert-Shafer Co., Erie, Pa.
Standard Electrical Tool Co., Cincinnati
U. S. Electrical Tool Co., 2489 W. Sixth St., Cincinnati, O.

GRINDING MACHINES, Chucking
Baird Machine Co., Bridgeport, Conn.
Blanchard Machine Co., Cambridge, Mass.
Bryant Chucking Grinder Co., Springfield, Vt.
Cincinnati Grinders Inc., Cincinnati, O.
Fitchburg Grinding Mach. Corp., Fitchburg, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES, Contour
Baker Bros. Inc., Toledo, Ohio
Production Machine Co., Greenfield, Mass.

GRINDING MACHINES, Cutter and Tool
Barber-Colman Co., 1200 River St., Rockford, Ill.
Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati
Covel Mfg. Co., Benton Harbor, Mich.
Davis Boring Tool Co., Div. Larkin-Packer Co., 6200 Maple Ave., St. Louis, Mo.
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Fellows Gear Shaper Co., Springfield, Vt.
Gallmeyer & Livingston Co., Grand Rapids
Gisholt Machine Co., Madison, Wis.
Gorton Machine Co., Geo., Racine, Wis.
Hisey Wolf Mach. Co., Colerain Ave., Cincinnati
Kearney & Trecker Co., Milwaukee
Landis Tool Co., Waynesboro, Pa.
R. K. LeBlond Machine Tool Co., Cincinnati
Norton Company, Worcester, Mass.
Oliver Instrument Co., Adrian, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Preis Engraving Mach. Co., H. P., 155 Summit St., Newark, N. J.
Prosser and Sons, Thos., 120 Wall St., N. Y. C.
Russell, Holbrook & Henderson, Inc., 99 Hudson St., New York City
Scheer Co., Inc., Geo., 128 Lafayette St., N. Y. C.
Schuyler, W. A., 250 W. 57th St., N. Y. C.
Sellers and Co., Inc., Wm., Phila., Pa.
Standard Electrical Tool Co., Cincinnati
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.
Steege Machinery Co., Chicago, Ill.
Sundstrand Machine Tool Co., Rockford, Ill.
Thompson Grinder Co., The, Springfield, Ohio
Union Twist Drill Co., Athol, Mass.
U. S. Electrical Tool Co., 2489 W. Sixth St., Cincinnati, O.
Walker Co., O. S., Worcester, Mass.

GRINDING MACHINES, Cylindrical
Arter Grinding Machine Co., Worcester, Mass.
Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Cincinnati Grinders, Inc., Cincinnati, Ohio
Dumore Co., Racine, Wis.
Farrel-Birmingham Co., Ansonia, Conn.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Hisey-Wolfe Machine Co., Cincinnati, O.
Kling Brothers Engineering Works, 1320 N. Koster Ave., Chicago, Ill.
Landis Tool Co., Waynesboro, Pa.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Norton Company, Worcester, Mass.
Thompson Grinder Co., The, Springfield, Ohio

GRINDING MACHINES, Die
Abrasive Machine Tool Co., East Providence, R. I.
Arter Grinding Machine Co., Worcester, Mass.
Baker Brothers Inc., Toledo, O.
Black and Decker Mfg. Co., Towson, Md.
Blanchard Machine Co., Cambridge, Mass.
Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.
Bryant Chucking Grinder Co., Springfield, Vt.
Clark Jr. Elec. Co., James, 600 Bergman St., Louisville, Ky.
Consolidated Mach. Tool Corp. Rochester (Colburn Div.)
Covel Mfg. Co., Benton Harbor, Mich.
Diamond Machine Co., Providence, R. I.
Dumore Co., Racine, Wis.
Gallmeyer and Livingston Co., Grand Rapids

GRINDING MACHINES, Die (Continued)
Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.
Hisey-Wolf Machine Co., Cincinnati, O.
Independent Pneumatic Tool Co., Chicago, Ill.
Madison-Kipp Corp., Madison, Wis.
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Mattison Mach. Works, Rockford, Ill.
Murchey Mach. & Tool Works, Detroit.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Standard Electrical Tool Co., Cincinnati
Stanley Elec. Tool Div. The Stanley Works, New Britain, Conn.
Strand Co., N. A., 5001 N. Lincoln St., Chicago, Ill.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.
Walker Co., O. S., Worcester, Mass.

GRINDING MACHINES, Disk
Besly and Co., Chas. H., 118-124 N. Clinton St., Chicago, Ill.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, O.
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Diamond Machine Co., Providence, R. I.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Gardner Machine Co., Beloit, Wis.
Hammond Machinery Bldrs., Inc., Kalamazoo, Mich.
Hanchett Mfg. Co., Big Rapids, Mich.
Hisey-Wolf Machine Co., The, Cincinnati, O.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Oliver Machinery Co., Grand Rapids, Mich.
Porter Cable Machine Co., Syracuse, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Machine Co., Greenfield, Mass.
Prosser and Sons, Thos., 120 Wall St., N. Y. C.
Standard Electrical Tool Co., Cincinnati
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Walls Sales Corp., 96 Warren St., New York

GRINDING MACHINES, Drill and Tap
Black Diamond Saw & Mach. Works, 43 North Ave., Natick, Mass.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Covel Mfg. Co., Benton Harbor, Mich.
Gallmeyer and Livingston Co., Grand Rapids
Hammond Machinery Bldrs., Inc., Kalamazoo, Mich.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Oliver Instrument Co., Adrian, Mich.
Sellers & Co., Inc., Wm., Phila., Pa.
Standard Electrical Tool Co., Cincinnati, O.
Union Twist Drill Co., Athol, Mass.

GRINDING MACHINES, Face and Ring Wheel
Abrasive Machine Tool Co., East Providence, R. I.
Besly & Co., Chas. H., 118-124 N. Clinton St., Chicago, Ill.
Blanchard Machine Co., Cambridge, Mass.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Diamond Machine Co., Providence, R. I.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Gardner Machine Co., 410 E. Gardner St., Beloit, Wis.
Hanchett Mfg. Co., Big Rapids, Mich.
Standard Electrical Tool Co., Cincinnati, O.
U. S. Electrical Tool Co., 2489 W. Sixth St., Cincinnati, O.
Walker Co., O. S., Worcester, Mass.

GRINDING MACHINES, Flexible Shaft
Dunmore Company, Racine, Wis.
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Jarvis Co., Charles L., Middletown, Conn.
McGonegal Mfg. Co., Rutherford, N. J.
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Strand Co., N. A., 5001 N. Lincoln St., Chicago, Ill.
Swartz & White Mfg. Co., 215 Washington St., Binghamton, N. Y.
United States Electrical Tool Co., 2488 West 6th St., Cincinnati, O.

GRINDING MACHINES, Floor
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Bryant Machinery and Engineering Co., 400 W. Madison St., Chicago, Ill.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
James Clark Jr., Elec. Co., 600 Bergman St., Louisville, Ky.
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Diamond Machine Co., Providence, R. I.
Forbes & Myers, 170 Union St., Worcester, Mass.
Hammond Machinery Bldrs., Inc., Kalamazoo, Mich.
Hisey-Wolf Machine Co., The, Cincinnati, O.
Hobart Bros. Co., Box FR-17, Troy, O.
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.

WHERE-TO-BUY DIRECTORY

GRINDING MACHINES, Floor (Continued)
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Oliver Machinery Co., Grand Rapids, Mich.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Ranso Grinding Machine Co., 320-326 Eighth St., Oshkosh, Wis.
Rivett Lathe and Grinder Co., Inc., Brighton, Boston, Mass.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Safety Grinding Wheel & Mach. Co., Springfield, O.
Standard Electrical Tool Co., Cincinnati, O.
Stokerunit Corp., Milwaukee, Wis.
Stow Mfg. Co., Inc., 443 State St., Binghamton, N. Y.
U. S. Electrical Motors Inc., Los Angeles
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, O.
Vonnegut Moulder Corp., 1819 Madison Ave., Indianapolis
Walker Co., O. S., Worcester, Mass.

GRINDING MACHINES, Gage
Baker Bros. Inc., Toledo, O.
Landis Tool Co., Waynesboro, Pa.
Triplex Mach. Tool Corp., 125 Barclay St., N. Y. C.

GRINDING MACHINES, Gear
Gleason Works, 1000 University Ave., Rochester, N. Y.
Lees-Bradner Co., Cleveland, Ohio.
Pratt and Whitney Co., Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.

GRINDING MACHINES, Internal
Baird Machinery Co., Bridgeport, Conn.
Bryant Chucking Grinder Co., Springfield, Vt.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
James Clark Jr. Elec. Co., 600 Bergman St., Louisville, Ky.
Dumore Co., The, Racine, Wis.
Heald Machine Co., Worcester, Mass.
Hisey-Wolf Machine Co., The, Cincinnati, O.
Landis Tool Co., Waynesboro, Pa.
Marburg Bros. Inc., 90 West St., New York
Rivett Lathe and Grinder Co., Inc., Brighton, Boston, Mass.
Standard Electrical Tool Co., Cincinnati, O.
Taylor and Fenn Co., The, Hartford, Conn.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, O.
Walker Co., O. S., Worcester, Mass.
Wicaco Machine Corp., Stenton Ave., Phila, Pa.

GRINDING MACHINES, Heavy Duty
Kling Bros. Engrg. Works, 1301 N. Kostner Ave., Chicago

GRINDING MACHINES, Knife and Shear Blade
Abrasive Machine Tool Co., East Providence, R. I.
Atkins & Co., E. C., 402 S. Illinois St., Indianapolis, Ind.
Arter Grinding Machine Co., Worcester, Mass.
Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Definance Machine Works, Definance, Ohio
Diamond Machine Co., Providence, R. I.
Hanchett Mfg. Co., Big Rapids, Mich.
Hisey-Wolf Machine Co., Cincinnati, O.
Mattison Machine Works, Rockford, Ill.
Rogers & Co., Samuel C., 191 Dutton Ave., Buffalo, N. Y.
Standard Electrical Tool Co., Cincinnati, O.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, O.

GRINDING MACHINES, Lathe Attachment
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
James Clark Jr., Electric Co., 600 Bergman St., Louisville, Ky.
Dumore Co., The, Racine, Wis.
Harding Bros., Inc., Elmira, N. Y.
Hisey-Wolf Machine Co., Cincinnati, O.
McGonegal Mfg. Co., The, Rutherford, N. J.
Rivett Lathe and Grinder Co., Inc., Brighton, Boston, Mass.
Speedway Mfg. Co., Cicero, Ill.
Stark Tool Co., Waltham, Mass.
Standard Electrical Tool Co., Cincinnati, O.
Strand Co., N. A., 5001 N. Lincoln St., Chicago, Ill.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, O.

GRINDING MACHINES, Link, Surface and Internal
Standard Tool Co., 6918 Central Ave., S. E., Cleveland, O.
Sundstrand Machine Tool Co., Rockford, Ill.

GRINDING MACHINES, Piston Ring
Arter Grinding Machine Co., Worcester, Mass.
Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.

GRINDING MACHINES, Plain
Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Grinders Inc., Cincinnati, O.
Diamond Machine Co., Providence, R. I.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Landis Tool Co., Waynesboro, Pa.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Norton Co., Worcester, Mass.
Prosser & Son, Thos., 120 Wall St., N. Y.
Standard Electrical Tool Co., Cincinnati, O.

GRINDING MACHINES, Portable
Black and Decker Mfg. Co., Towson, Md.
Buckeye Portable Tool Co., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 E. 44th St., N. Y. C.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
James Clark, Jr. Elec. Co., 600 Bergman St., Louisville, Ky.
Diamond Machine Co., Providence, R. I.
Diehl Mfg. Co., Elizabethport, N. J.
Dumore Co., The, Racine, Wis.
Hammond Machinery Bldrs, Inc., Kalamazoo, Mich.
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Helwig Mfg. Co., St. Paul, Minn.
Hisey-Wolf Machine Co., The, Cincinnati, O.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Charles L. Jarvis Co., Middletown, Conn.
Madison Kipp Corp., Madison, Wis.
McGonegal Mfg. Co., Rutherford, Conn.
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Marathon Elec. Mfg. Corp., Wausau, Wis.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Porter Cable Machine Co., Syracuse, N. Y.
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio
Ryerson & Sons, Jos. T., Inc., 2558 W. 16th St., Chicago, Ill.
Safety Grinding Wheel & Mach. Co., Springfield, O.
Savage Co., W. J., Knoxville, Tenn.
Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill.
Standard Electrical Tool Co., Cincinnati, O.
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.
Strand Co., N. A., 5001 N. Lincoln St., Chicago, Ill.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, O.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

GRINDING MACHINES, Radius
Diamond Machine Co., Providence, R. I.
Landis Tool Co., Waynesboro, Pa.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Sundstrand Machine Tool Co., Rockford, Ill.
Union Twist Drill Co., Athol, Mass.
Van Norman Machine Tool Co., Springfield, Mass.

GRINDING MACHINES, Roll
Cincinnati Grinders, Inc., Cincinnati, Ohio
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
James Clark Jr. Elec. Co., 600 Bergman St., Louisville, Ky.
Dunmore Co., Racine, Wis.
Farrel-Birmingham Co., Ansonia, Conn.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Landis Tool Co., Waynesboro, Pa.
Marburg Bros., Inc., 90 West St., New York
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Norton Co., Worcester, Mass.
Standard Electrical Tool Co., Cincinnati, Ohio
U. S. Electrical Tool Co., 2489 W. Sixth St., Cincinnati, O.

GRINDING MACHINES, Surface
Abrasive Machine Tool Co., E. Providence, R. I.
American Machine Tool Co., Hackettstown, N. J.
Arter Grinding Machine Co., Worcester, Mass.
Bergram Mech. Engineering Co., New Britain, Conn.
Besley and Co., Chas. H., 118-124 N. Clinton St., Chicago, Ill.
Blanchard Machine Co., Cambridge, Mass.
Bridgeport Safety Emery Wheel Co., Inc., 1302 W. Broad St., Bridgeport, Conn.
Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
James Clark, Jr., Elec. Co., 600 Bergman St., Louisville, Ky.
Covel Mfg. Co., Benton, Harbor, Mich.
Diamond Machine Co., Providence, R. I.
Gallmeyer and Livingston Co., Grand Rapids
Gardner Machine Co., Beloit, Wis.
Hanchett Mfg. Co., Big Rapids, Mich.
Heald Machine Co., Worcester, Mass.
Hisey-Wolf Machine Co., Cincinnati, O.
Mattison Machine Works, Rockford, Ill.
Norton Co., Worcester, Mass.
Pratt Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reid Brothers Co., Beverly, Mass.
Standard Electrical Tool Co., Cincinnati, Ohio
Steege Mach. Co., Chicago, Ill.
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.
Thompson Grinder Co., Springfield, Ohio
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Walker and Co., O. S., Worcester, Mass.
Wesson Co., Detroit, Mich.
Williams, White & Co., Moline, Ill.

GRINDING MACHINES, Swing
Diamond Machine Co., Providence, R. I.
Hammond Machinery Bldrs., Inc., Kalamazoo, Mich.

GRINGING MACHINES, Swing (Continued)
Standard Electrical Tool Co., Cincinnati, Ohio
U. S. Electrical Tool Co., 2489 W. Sixth St., Cincinnati, O.
Vonnegut Moulder Corp., 1819 Madison Ave., Indianapolis

GRINDING MACHINES, Universal
Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Grinders, Inc., Cincinnati, Ohio
Covel Mfg. Co., Benton Harbor, Mich.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond Mach. Tool Co., R. K., Cincinnati
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Norton Co., Worcester, Mass.
Rivett Lathe and Grinder Co. Inc., Brighton, Boston, Mass.
Steege Machine Co., Chicago, Ill.
Thompson Grinder Co., Springfield, Ohio

GRINDING MACHINES, Vertical
Abrasive Machine Tool Co., East Providence, R. I.
Baird Mach Co., Bridgeport, Conn.
Besley & Co., Charles H., 118-124 N. Clinton St., Chicago, Ill.
Bergram Mech. Engineering Co., New Britain, Conn.
Blanchard Machine Co., 64 State St., Cambridge, Mass.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Galleyer & Livingston Co., 336 Straight Ave. S.W., Grand Rapids, Mich.
Gardner Machine Co., 410 E. Gardner St., Beloit, Wis.
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Hanchett Mfg. Co., 906 North State St., Big Rapids, Mich.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Norton Co., Worcester, Mass.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio

GRINDING SPINDLES
Bryant Chucking Grinder Co., 257 Clinton St., Springfield, Vt.
Dumore Co., The, 135 14th St., Racine, Wis.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Heald Machine Co., New Bond St., Worcester, Mass.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio

GRINDING WHEEL DRESSERS (see Dressers, Grinding Wheel)

GRINDING WHEELS
Abrasive Company, Tacony and Fraley St., Phila., Pa.
Allison Company, 257 Island Brook Ave., Bridgeport, Conn.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Bakelite Corp., Bound Brook, N. J.
Bay State Abrasive Products Co., Union St., Westboro, Mass.
Besley & Co., Charles H., 118-124 N. Clinton St., Chicago, Ill.
Blanchard Machine Co., 4 State St., Cambridge, Mass.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Carborundum Co., Niagara Falls, N. Y.
Cincinnati Milling Machine Co., Cincinnati
deSanno & Son., A. P., Philadelphia, Pa.
Dumore Company, Racine, Wis.
Gardner Machine Co., 410 E. Gardner St., Beloit, Wis.
General Plastics, Inc., North Tonawanda, N. Y.
Gilmore & Co., F. F., 112 Dartmouth St., Boston, Mass.
Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.
Macklin Co., Jackson, Mich.
Madison-Kipp Corp., Madison, Wis.
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.
Mid-West Abrasive Co., 3189 Beaufait St., Detroit, Mich.
Norton Company, Worcester, Mass.
Prosser & Son, Thos., 120 Wall St., New York
Safety Grinding Wheel & Mach. Co., Springfield, O.
Sterling Grinding Wheel Co., Broad Ave., Tiffin, O.
Vitrified Wheel Co., Emery St., Westfield, Mass.
Western Tool & Mfg. Co., Springfield, O.

GUARDS, FOOT, TOE, SHIN
Ellwood Safety Appliance Co., Ellwood City, Pa.

GUARDS FOR GRINDING WHEELS
Gallmeyer & Livingston Co., 336 Straight Ave., S.W., Grand Rapids, Mich.
Hisey-Wolf Machine Co., Cincinnati, O.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, O.
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.

GUARDS, Press
Humm Tool & Mach. Co., 253 Sheffield Ave., Brooklyn, N. Y.

WHERE-TO-BUY DIRECTORY

HACK SAW BLADES
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Barnes Co., Inc., W. O. 1297 Terminal Ave., Detroit, Mich.
Clemson Bros. Inc., 22 Cottage St., Middletown, N. Y.
Disston & Sons, Inc., Henry, Tacony, Phila. Pa.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Ryerson & Son, Inc., Jos. T., 16th & Rockwell Sts., Chicago, Ill.
Starrett Co., L. S., Crescent St., Athol, Mass.
Victor Saw Works, Inc., 22 Cottage St., Middletown, N. Y.

HACK SAW FRAMES
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Clemson Bros. Inc., 22 Cottage St., Middletown, N. Y.
Disston & Sons, Inc., Henry, Tacony, Phila.
Forsberg Mfg. Co., Bridgeport, Conn.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Starrett Co., The L. S., Crescent St., Athol, Mass.

HACK SAWS, POWER
Champion Blower & Forge Co., Lancaster, Pa.

HAMMERS, Drop
Bliss Co., E. W., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Henderson Machine Co., 5032 Germantown Ave., Philadelphia, Pa.
Marburg Brothers, Inc., 90 West St., N. Y.
Morgan Engineering Co., Alliance, O.
Williams, White & Co., Moline, Ill.

HAMMERS, Portable Power
Black & Decker Mfg. Co., Towson, Md.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Cleveland Pneumatic Tool Co., 3734 E. 76th St., Cleveland
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand & Co., 11 Bway., N. Y. C.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.
Speedway Mfg. Co., 1834 S. 52nd Ave., Cicero, Ill.
Sullivan Machinery Co., Michigan City, Ind.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, O.
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.

HAMMERS, Power
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Erie Foundry Co., Erie, Pa.
General Machine Corp. (Niles Tool Wks. Div.) 545 N. Third St., Hamilton, O.
Marburg Brothers, Inc., 90 West St., N. Y. C.
Ingersoll-Rand & Co., 11 Bway., N. Y.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.

HAMMERS, Softfaced
Bonney Forge & Tool Works, Allentown, Pa.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Forsberg Mfg. Co., Bridgeport, Conn.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Green, Tweed & Co., 109 Duane St., N. Y.
Stanley Tools, New Britain, Conn.

HAMMERS, Steam
Chambersburg Engrg. Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Morgan Engrg. Co., Alliance, O.

HANDLES, Crank & Machine
Cincinnati Ball & Crank Co., Cincinnati

HANDLES, File
Delta File Works, 4837 James St., Phila., Pa.
Disston & Sons, Inc., Henry, Tacony, Phila.
Nicholson File Co., Providence, R. I.

HAND SCRAPERS
Anderson Bros., Mfg. Co., Rockford, Ill.
Disston & Sons, Inc., Henry, Tacony, Phila.
Millers Falls Co., 57 Wells St., Greenfield, Mass.

HANGERS, Shaft
Boston Gear Works, Inc., North Quincy, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Dodge Mfg. Corp., Mishawaka, Ind.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
Hanson Clutch & Machinery Co., Tiffin, O.
Link-Belt Co., 2410 W. 18 St., Chicago
Morse Chain Co., Ithaca, N. Y.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.

HANGERS, Shaft (Continued)
S.K.F. Industries, Inc., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Standard Pressed Steel Co., Jenkintown, Pa.

HARD-FACING ALLOYS
Air Reduction Sales Co., 60 E. 42nd St., N. Y.
Colmonoy Inc., P. O. Box 977, Los Nietos, Calif.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Kokomo, Ind.
Lincoln Electric Co., Coit Road and Kirby Ave., Cleveland, Ohio
Linde Air Products Co., Inc., New York City
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Michigan Tool Co., Detroit, Mich.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Tungsten Elec. Corp., New York City, N. Y.

HARDNESS MEASURING INSTRUMENTS
Olsen Testing Machine Co., Tinius, 500 N. 12th St., Phila., Pa.
Shore Instrument and Mfg. Co., Jamaica, N. Y.
Thwing-Albert Instrument Co., 3337 Lancaster Ave., Phila., Pa.
Wilson Mechanical Instrument Co., 383 Concord Ave., New York, N. Y.

HEADING MACHINES
Acme Machinery Co., 4533 St. Clair Ave., Cleveland, Ohio
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
National Machinery Co., Tiffin, Ohio
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

HEADS, Tool
Production Tool Co., Bridgeport, Conn.

HEAT EXCHANGERS
Harrison Radiator Div. General Motors Corp., Lockport, N. Y.

HEAT TREATING
Air Reduction Sales Co., 60 E. 42nd St., N. Y.
American Gas Furnace Co., Elizabeth, N. J.
Bellis Heat Treating Co., Branford, Conn.
Chapman Valve Mfg. Co., Pinevale St., Indian Orchard, Mass.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Houghton & Co., E. F., Phila., Pa.
Lindberg Engrg. Co., 221 N. Laflin St., Chicago
Meisel Press Mfg. Co., Boston, Mass.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Rickert-Shafer Co., 613 W. 11th St., Erie, Pa.
Strong, Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio
Taft-Peirce Mfg. Co., Woonsocket, R. I.
U. S. Tool Co. Inc., Ampere, N. J.
Vincent Steel Process Co., 2434 Bellevue Ave., Detroit, Mich.
Wiedemann Machine Co., 1815 Sedgley Ave., Phila., Pa.

HEAT TREATING INSTRUMENTS
Brown Instrument Co., Phila., Pa.

HEATERS, Space
Anderson Co., V. D., 1935 W. 96th St., Cleveland, O.
American Foundry Equipment Co., Mishawaka, Ind.
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Cutler Hammer, Inc., 315 N. 12th St., Milwaukee, Wis.
Electric Air Heater Co. Div. of American Fdry. Equip. Co., Mishawaka, Ind.
Surface Combustion Corp., Toledo, O.
Trent Co., Harold E., 618 N. 54th St., Phila.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

HEATERS, Unit
Surface Combustion Co., Toledo, O.
Unit Heater & Cooler Co., 1002 Third St., Wausau, Wis.
Wing, L. J., Mfg. Co., 154 W. 14th St., N. Y. C.

HOBBING MACHINES
Adams Co., E. Fourth St., Dubuque, Iowa
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Hobbing Machine Co., E. 152nd St., Cleveland, O.
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Scherr Co., Inc., Geo., 128 Lafayette St., N. Y. C.
Steege Machy Co., Chicago, Ill.
Triplex Mach. Tool Corp., 125 Barclay St., N. Y. C.

HOBS
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Bates, H. O., 68 Barclay St., N. Y. C.
Brown & Sharpe Mfg. Co., Providence, R. I.
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 435 Capitol Ave., Hartford, Conn.
Union Twist Drill Co., Athol, Mass.

HOISTS, Air
Chicago Pneumatic Tool Co., 6 E. 44th St., N. Y. C.
Curtis Pneumatic Machinery Co., 1924 Kienler Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Keckley Co., O. C., 567 Washington Blvd., Chicago, Ill.
Logansport Machine Inc., Logansport, Ind.
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.
Northern Engineering Works, Chene and Atwater Sts., Detroit, Mich.
Sullivan Machinery Co., Michigan City, Ind.
Tomkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.

HOIST, Chain
Canton Fdry. & Mach. Co., 6400 Breakwater Ave., Cleveland, O.
Ford Chain Block Div. Amer. Chain & Cable Co., Inc., Phila., Pa.
Northern Engineering Works, Chene and Atwater Sts., Detroit, Mich.
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Round & Son, David, Newburgh Station, Cleveland, O.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Union Mfg. Co., New Britain, Conn.
Wright Mfg. Div. of Amer. Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., Philadelphia Division, 4530 Tacony St., Phila., Pa.

HOISTS, Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Engineering Co., 2407 Aramingo Ave., Phila., Pa.
Euclid Crane & Hoist Co., Euclid, O.
Electric Lift, Inc., 30 Church St., N. Y. C.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Independent Pneumatic Tool Co., Chicago, Ill.
Northern Engineering Works, Chene & Atwater Sts., Detroit, Mich.
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Philadelphia Gear Works, Phila., Pa.
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Sullivan Machinery Co., Michigan City, Ind.
Wright Mfg. Div. Amer. Chain Co., Inc., Bridgeport, Conn.
Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Phila., Pa.

HOISTS, Pneumatic
Chicago Pneumatic Tool Co., 6 E. 44th st., N. Y. C.
Curtis Pneumatic Machinery Co., 1924 Kiener Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Keckley, O. C., 567 Washington Blvd., Chicago
Logansport Machine Inc., Logansport, Indiana
Northern Engineering Works, Chene & Atwater Sts., Detroit, Mich.
Sullivan Machinery Co., Michigan City, Ind.
Tomkins-Johnson Co., 615 Mechanic St., Jackson, Mich.

HOLDERS, Adjustable for Gage Blocks
Ford Motor Co., Johanssen Div., 3674 Schaefer Rd., Dearborn, Mich.

HOLDERS, Floating
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corporation, 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

HOLDERS, Stop Collar
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corporation, 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.

HONING MACHINES
Barnes Drill Co., 814 Chestnut St., Rockford, Ill.
Bay State Abrasive Products Co., Westboro, Mass.
Micromatic Hone Corp., Detroit, Mich.

HONING MACHINES, Horizontal
Barnes Drill Co., Rockford, Ill.

HONING TOOLS
Micromatic Hone Corp., 7401 Dubois St., Detroit, Mich.

HOSE, Asbestos
New York Belting & Packing Co., 1 Market St., Passaic, N. J.

HOSE, Flexible Metal
American Brass Co. (American Metal Hose Branch) Waterbury, Conn.

WHERE-TO-BUY DIRECTORY

HOSE, Flexible Metal (Continued)
Chicago Metal Hose Corp., 1315 South 3rd Ave., Maywood, Ill.
Tite Flex. Metal Hose Co., 500 Frelinghuysen Ave., Newark, N. J.

HOSE, Rubber
Binks Mfg. Co., 3114 Carroll Ave., Chicago
De Vilbiss Co., Toledo, Ohio
Dayton Rubber Mfg. Co., Dayton, Ohio
Electric Hose and Rubber Co., Wilmington, Del.
Gates Rubber Co., Denver, Colo.
Goodrich Company, B. F., Akron, Ohio
Manhattan Rubber Mfg. Div. of Raybestos Manhattan Inc., Passaic, N. J.

HYDRAULIC DRILLING MACHINES
Barnes Drill Co., Rockford, Ill.

HYDRAULIC HONING MACHINES
Barnes Drill Co., Rockford, Ill.

HYDRAULIC FEED UNITS
Hoefer Mfg. Co., Inc., Freeport, Ill.

HYDRAULIC MACHINERY
American Broach & Machine Co., 415 W. Huron St., Ann Arbor, Mich.
American Engineering Co., 2407 Armingo Ave., Philadelphia, Pa.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Bliss Co., E. W., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Buckeye Iron & Brass Works, 326 E. 3rd St., Dayton, Ohio
Chambersburg Engineering Co., Chambersburg, Pa.
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.
Dudgeon, Inc., Richard, 24 Columbia St., N. Y. C.
Dunning & Boschert Press Co., Inc., 390 W. Water St., Syracuse, N. Y.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Ex-Cell-O Corporation, 1200 Oakman Blvd., Detroit, Mich.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Keckley, O. C., 567 Washington Blvd., Chicago
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Monarch Machine Tool Co., Sidney, Ohio
National Automatic Tool Co., S. 7th and N. Sts., Richmond, Ind.
Oilgear Co., The, 1430 W. Bruce St., Milwaukee, Wis.
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Progressive Welder Co., 737 Piquette Ave., Detroit, Mich.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Robertson Co., John, 121 Water St., Bklyn., N. Y.
Tompkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.
United Eng. & Fdry. Co., Pittsburgh, Pa.
Van Atta & Co., Inc., E. B., Penn Ave., Olson, N. Y.
Vickers, Inc., 1410 Oakman Blvd., Detroit
Watson-Stillman Co., New York, N. Y.
Williams, White & Co., Moline, Ill.
Wood Company, R. D., Philadelphia, Pa.

HYDRAULIC POWER UNITS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Engineering Co., 2407 Armingo Ave., Philadelphia, Pa.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Foote-Burt Co., 13000 St. Clair Ave., Cleveland.
Fox Machine Co., 1410 W. Genson St., Jackson, Mich.
Hoefer Mfg. Co., 213 S. Chicago Ave., Freeport, Ill.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Keckley Co., O. C., 567 Washington Blvd., Chicago, Ill.
Lake Erie Eng. Corp., Kenmore Sta., Buffalo, N. Y.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Leland Gifford Co., Worcester, Mass.
Logansport Machine Inc., Logansport, Ind.
National Automatic Tool Co., S. 7th and N Sts., Richmond, Ind.
New Britain-Gridley Machine Div. New Britain Machine Co., 140 Chestnut St., New Britain, Conn.
Oilgear Co., 1403 W. Bruce St., Milwaukee
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Roper Corp., Geo. W., Blackhawk Park Ave., Rockford, Ill.
Sundstrand Machine Tool Co., Rockford, Ill.
Vickers Incorporated, 1410 Oakman Blvd., Detroit, Mich.
Wood Company, R. D., Philadelphia, Pa.

HYDRAULIC PRESSES (see Presses, Hydraulic)

HYGROMETERS
Brown Instrument Co., Phila., Pa.

IMPREGNATORS, Centrifugal
Barrett Co., Leon J., Worcester, Mass.

INDEX BASE
Sundstrand Machine Tool Co., Rockford, Ill.

INDEX CENTERS
Abrasive Machine Tool Co., East Providence, R. I.
Brown & Sharpe Mfg. Co., Providence, R. I.
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Knight Machinery Co., W. B., 3920 W. Pine Blvd., St. Louis, Mo.
Stark Tool Co., Waltham, Mass.

INDEX DRILL
Huot Mfg. Co., 128 E. 10th St., St. Paul, Minn.

INDEX PLATES
Brown & Sharpe Mfg. Co., Providence, R. I.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Stark Tool Co., Waltham, Mass.

INDEX TABLES
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Cleveland Universal Jig Co., 13325 St. Clair Ave., Cleveland, Ohio
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
Knight Machinery Co., W. B., 3920 W. Pine Blvd., St. Louis, Mo.

INDICATORS, Dial (see Gages, Dial)

INDICATORS, Speed
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Bristol Co., Waterbury, Conn.
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston & Sons, Inc., Henry, Tacony, Phila.
Montgomery & Co., Inc., 129 Crosby St., N. Y. C.
Scherr Co., Inc., Geo., 128 Lafayette St., N. Y.
Starrett Co., L. S., Crescent St., Athol, Mass.
Veeder-Root Incorporated, Hartford, Conn.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.

INDICATORS, Temperature
Bristol Co., Waterbury, Conn.
Brown Instrument Co., (A Div. of Minneapolis-Honeywell Reg. Co.), 4501 Wayne Ave., Philadelphia, Pa.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Marsh Corp., Jas. P., 2073 Southport Ave., Chicago, Ill.
Partlow Corp., 2 Campion Road, New Hartford, N. Y.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford, Conn.
Taylor Instrument Co., Rochester, N. Y.
Thwing-Albert Instrument Co., 3337 Lancaster Ave., Philadelphia, Pa.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.

INDICATORS, Test
Brown & Sharpe Mfg. Co., Providence, R. I.
Brown Instrument Co., (A Div. of Minneapolis-Honeywell Reg. Co.), 4501 Wayne Ave., Philadelphia, Pa.
Federal Products Co., 144 Eddy St., Providence, R. I.
Index Machinery Corp., 49 Central Ave., Cincinnati, O.
Koch Test Indicators, 29-2nd Ave., Nyack, N. Y.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Mine Safety Appliance Co., Braddock St., Pittsburgh
Randall & Stickney, Waltham, Mass.
Starrett Co., L. S., Crescent St., Athol, Mass.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Van Keuren Co., 12 Copeland St., Watertown, Mass.

INDUSTRIAL FINISHES
Everseal Mfg. Co., Fisk Bldg., N. Y. C.

INFRA RED LAMPS
Adjustable Fixture Co., Milwaukee, Wis.

INSULATING MACHINES
Syncro Machine Co., 187 Sylvan Ave., Newark, N. J.

INSULATING MATERIALS, Felt, Fibre, Bakelite and Mica
Bakelite Corp., Bound Brook, N. J.
Botfield Refractories Co., Swanson & Clymer Sts., Phila. Pa.
Continental Diamond Fibre Co., Newark, Del.
Felters Co., Inc., 210 South St., Boston, Mass.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
General Electric Co., Schenectady, N. Y.
Quigley Co. Inc., 56 W. 45th St., N. Y. C.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

INSTRUMENTS, Electrical Measuring
Bristol Company, Waterbury, Conn.
Brown Instrument Co., (A Div. of Minneapolis-Honeywell Reg. Co.), 4501 Wayne Ave., Philadelphia, Pa.
General Electric Co., Schenectady, N. Y.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Western Electrical Inst. Corp., 614 Frelinghuysen Ave., Newark, N. J.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
United Eng. & Fdry. Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa.

INSTRUMENTS SURVEYING
Bruning Co., Inc., Chas., 102 Reade St., N. Y. C.

INSURANCE
Liberty Mutual Insurance Co., Boston, Mass.

JACKETS, Foundry
Adams Company, East 4th St., Dubuque, Iowa
American Foundry Equipment Co., Mishawaka, Ind.

JACKS, Hand Lift
All Steel Welded Truck Corp., Rockford, Ill.

JACKS, Hydraulic
Black Hawk Mfg. Co., Milwaukee, Wis.
Richard Dudgeon, Inc., 24 Columbia St., N. Y.
Charles F. Elmes Engineering Works, 1001 Fulton St., Chicago, Ill.
Keckley Co., O. C., 567 Washington Blvd., Chicago, Ill.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Watson-Stillman Co., Roselle, N. J.

JACKS, Planer
Armstrong Bros., Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Starrett Co., L. S., Crescent St., Athol, Mass.

JAWS FOR PRECISION GAGE BLOCKS
Ford Motor Co., Johansson Div., 3674 Shaefer Rd., Dearborn, Mich.

JIGS AND FIXTURES (see Contract Work)

JIG BORDERS (see Boring Machines, Jig)

JOINTS, Pipe
Dresser Mfg. Co., S. R., Bradford, Pa.

JOINTS, Universal
Apex Mach. & Tool Co., Dayton, O.

KEYS, Machine
Morton Mfg. Co., Muskegon Heights, Mich.

KEYS, Woodruff
Morton Mfg. Co., Muskegon Heights, Mich.

KEYSEATING MACHINES
American Broach & Machine Co., 415 W. Huron St., Ann Arbor, Mich.
Baker Bros., Inc., Post St., Toledo, Ohio
Consolidated Machine Tool Corp., Rochester
Davis Keyseater Co., Rochester, N. Y.
General Machinery Corp. (Niles Tool Wks. Div.) 545 N. Third St., Hamilton, Ohio
Mitts & Merrill, 913 Tilden St., Saginaw, Mich.
Morton Mfg. Co., Muskegon Heights, Mich.
National Machine Tool Co., 2272 Spring Grove Ave., Cincinnati, Ohio

KNIVES, Machine
Disston & Sons, Inc., Henry, Tacony, Phila.

KNURL HOLDERS
American Swiss File & Tool Co., Elizabeth, N. J.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Graham Mfg. Co., 73 Willard Ave., Providence
Pratt & Whitney, Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Wade Tool Co., 49 River St., Waltham, Mass.

KNURLS
American Swiss File & Tool Co., Elizabeth, N. J.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Graham Mfg. Co., 73 Willard Ave., Providence
Pratt & Whitney, Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Williams Co., J. H., 75 Spring St., N. Y. City

LABORATORY APPARATUS
American Instrument Co., Washington, D. C.

LABORATORY WARE, Refractory
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

LACQUERS
Bakelite Corp., Bound Brook, N. J.
Sherwin-Williams Co., 101 Prospect Ave., Cleveland
Hague & Co., Inc., Alfred 227 34th St., Brooklyn, N. Y.
Kay & Ess Co., Dayton Ohio
Maas & Waldstein, Newark, N. J.
Roxalin Flexible Lacquer Co., Box A, Elizabeth, N. J.

LAMPS, Electric
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

LAMPS, Heat
Adjustable Fixture Co., Milwaukee

LAMPS, Machine and Bench
Adjustable Fixture Co., Milwaukee
Fostoria Pressed Steel Corp., Fostoria, Ohio
McCrosky Tool Corp., Meadville, Pa.

LAPPING MACHINES
Brickner Kropf Mach. Co., Muskegon Heights, Mich.
Onsrud Mach. Works, Inc., 3921 Palmer St., Chicago

WHERE-TO-BUY DIRECTORY

LAPPING MACHINES, Centerless
Cincinnati Grinders, Inc., Cincinnati, Ohio
Production Machine Co., Greenfield, Mass.

LAPPING MACHINES, Cylindrical and Flat
Diamond Machine Co., Providence, R. I.
Marburg Brothers, Inc., 90 West St., N. Y.
Moline Tool Co., 102 Twentieth St., Moline, Ill.
Norton Co., Worcester, Mass.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

LAPS, Gear
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Vinco Tool Co., 7350 Central Ave., Detroit

LATHE ATTACHMENTS
Ames Co., B. C., Waltham, Mass.
Atlas Press Co., 1849 N. Pitcher St., Kalamazoo, Mich.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cullman Wheel Co., Chicago, Ill.
Gisholt Machine Co., 1301 E. Washington Ave., Madison, Wis.
Hardinge Brothers, Inc., Elmira, N. Y.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Madison and Edwards Roads, Cincinnati, Ohio
McCrosky Tool Corp., 1340 80 S. Main St., Meadville, Pa.
Monarch Machine Co., Sidney, Ohio
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Rockford Machine Tool Co., Rockford, Ill.
South Bend Lathe Works, South Bend, Ind.
Stark Tool Co., Waltham, Mass.

LATHE DRIVES
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cleveland Electric Motor Co., 5213 Chester Ave., Cleveland, Ohio
Cullman Wheel Co., 1344 Altgeld St., Chicago
Dayton Rubber Mfg. Co., Dayton, Ohio
Hardinge Brothers, Inc., Elmira, N. Y.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Rivett Lathe & Grinder Inc., Brighton, Boston
Sebastian Lathe Co., Cincinnati, O.
Sheldon Mach. Co., 3253 Cottage Grove Ave., Chicago
Stark Tool Company, Waltham, Mass.

LATHE TOOLS
Apex Tool & Cutter Co., Shelton, Conn.
Armstrong Bros Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati
Colonial Broach Co., Detroit, Mich.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Detroit Tap & Tool Co., Detroit, Mich.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Fansteel Metallurgical Corp, 2200 Sheridan Rd., N. Chicago, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Gisholt Machine Co., 1301 E. Washington Ave., Madison, Wis.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Haynes Stellite Co., Kokomo, Ind.
Hendey Machine Co., 105 Summer Rd., Torrington, Conn.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Michigan Tool Co., Detroit, Mich.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
O. K. Tool Co., Shelton, Conn.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
R. & L. Tools, Nicetown, Phila., Pa.
Ready Tool Co., 550 Iranistan Ave., Bridgeport, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Tungsten Carbide Tool Co., Detroit
Wesson Co., Detroit, Mich.
Western Tool & Mfg. Co., Springfield, Ohio

LATHES, Automatic and Semi-Automatic
Automatic Machine Co., Bridgeport, Conn.
Baird Machine Co., Bridgeport, Conn.
Cleveland Automatic Mach. Co., Ashland Rd., Cleveland, Ohio
Bullard Co., Canfield Ave., Bridgeport, Conn.
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Goss & deLeeuw Machine Co., New Britain, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond Machine Tool Co., R. K., Madison and Edward Rds., Cincinnati, Ohio
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio

LATHES, Automatic and Semi-Automatic (Cont.)
Monarch Machine Co., Sidney, Ohio
National Acme Co., Cleveland, Ohio
New Britain Gridley Mach. Div., The New Britain Mach. Co., New Britain, Conn.
Partool Mach. Co., 9111 Schaefer Rd., Detroit
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Potter & Johnson Machine Co., Pawtucket, R. I.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Sebastian Lathe Co., Cincinnati, Ohio
Seneca Falls Machine Co., Seneca Falls, N. Y.
Sundstrand Machine Tool Co., Rockford, Ill.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Wickes Bros., 512 N. Water St., Saginaw, Mich.

LATHES, AUTOMATIC FORM TURNING
American Tool Works Co., Pearl & Eggleston Aves., Cincinnati, Ohio
Bullard Co., Canfield Ave., Bridgeport, Conn.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati
Goss & deLeeuw Machine Co., New Britain, Conn.
LeBlond Machine Tool Co., R. K., Cincinnati
Monarch Machine Co., The, Sidney, Ohio
Potter & Johnston Machine Co., Pawtucket, R. I.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester Mass.
Seneca Falls Machine Co., Seneca Falls, N. Y.
United Engrg. & Foundry Co., Pittsburgh, Pa.

LATHES, Bench
Ames Co., B. C., Waltham, Mass.
Atlas Press Co., 1849 N. Pitcher St., Kalamazoo, Mich.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Hardinge Brothers, Inc., Elmira, N. Y.
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rivett Lather & Grinder Co., Inc., 29 Riverview Rd., Brighton, Boston, Mass.
Sebastian Lathe Co., Cincinnati, Ohio
Seneca Falls Machine Co., Seneca Falls, N. Y.
Sidney Machine Tool Co., Sidney, Ohio
South Bend Lathe Works, South Bend, Ind.
Stark Tool Co., Waltham, Mass.
Wade Tool Co., 49 River St., Waltham, Mass.

LATHES, Bottle Mold
Acme Machine Tool Co., 4955 Spring Grove Ave., Cincinnati, O.
American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio
Bardons & Oliver, Inc., 1133 W. 9th St., Cleveland, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
LeBlond Machine Tool Co., R. K., Cincinnati, Ohio
Monarch Machine Co., Sidney, Ohio
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

LATHES, CRANKSHAFT
American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y. (Betts-Bridgeford Div.)
LeBlond Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
Marburg Brothers, Inc., 90 West St., N. Y.
Potter & Johnston Machine Co., Pawtucket, R. I.
Wickes Bros, 512 N. Water St., Saginaw, Mich.

LATHES, Double-End Turning and Facing
Sundstrand Machine Tool Co., Rockford, Ill.

LATHES, Engine
American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio
Boye & Emmes Machine Tool Co., Cincinnati
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati
Consolidated Machine Tool Corp., Rochester
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Greaves-Klusman Mach. Tool Co., 3120 Forrer St., Cincinnati, Ohio
Hendey Machine Co., 105 Summer St., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Lehmann Machine Co., St. Louis, Mo.
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
Monarch Machine Tool Co., Sidney, Ohio
Porter McLeod Mach. Tool Co., Hatfield, Mass.
Pratt & Whitney, Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Niles Tool Works Co., Hamilton, Ohio
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Rockford Machine Tool Co., Rockford, Ill.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Sebastian Lathe Co., Cincinnati, O.
Seneca Falls Machine Co., Seneca Falls, N. Y.
Sidney Machine Tool Co., Sidney, Ohio
South Bend Lathe Works, South Bend, Ind.
Springfield Machine Tool Co., 631 W. Southern Ave., Springfield, Ohio
Wickes Bros., 512 N. Water St., Saginaw, Mich.

LATHES, Extension Bed and Gap
Cincinnati Lathe & Tool Co., Oakley, Cincinnati
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio

LATHES, Gap
American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
LeBlond Machine Tool Co., R. K., Madisen and Edwards Rds., Cincinnati, Ohio
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
Sebastian Lathe Co., Cincinnati, O.
South Bend Lathe Works, South Bend, Ind.

LATHES, Horizontal Turrett
Acme Machine Tool Co., 4955 Spring Grove Ave., Cincinnati, Ohio
Bardons & Oliver, Inc., 1133 W. 9th St., Cleveland, O.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Goss & deLeeuw Machine Co., New Britain, Conn.
Hardinge Brothers, Inc., Elmira, N. Y.
International Machine Tool Co., Indianapolis
Jones & Lamson Machine Co., Springfield, Vt.
Millholland Sales & Mach. Co., Indianapolis, Ind.
Partool Mach. Co., 9111 Schaefer Rd., Detroit
Potter & Johnston Machine Co., Pawtucket, R. I.
Rivett Lathe & Grinder, Inc., Brighton, Boston
Springfield Machine Tool Co., 631 W. Southern Ave., Springfield, Ohio
Stark Tool Co., Waltham, Mass.
Warner & Swasey Co., The, 5701 Carnegie Ave., Cleveland, Ohio

LATHES, Monitor Brass
Acme Machine Tool Co., 4955 Spring Grove Ave., Cincinnati, Ohio
Bardons & Oliver, Inc., 1133 W. 9th St., Cleveland, O.
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Dreses Machine Tool Co., 3366 Beekman St., Cincinnati, Ohio
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

LATHES, Oil Country
American Tool Works Co., Cincinnati, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati
Consolidated Mach. Tool Corp., Rochester (Betts Bridgeford Div.)
Gisholt Machine Co., Madison, Wis.
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio

LATHES, Portable
American Tool Works Co., Pearl and Eggelston Aves., Cincinnati, Ohio
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
Monarch Machine Tool Co., Sidney, Ohio
Sebastian Lathe Co., Cincinnati, O.
Seneca Falls Machine Co., Seneca Falls, N. Y.
Springfield Machine Tool Co., 631 W. Southern Ave., Springfield, Ohio

LATHES SPINNING
Bliss Co., E. W., Brooklyn, N. Y.
Oliver Machinery Co., Grand Rapids, Mich.

LATHES, Thread Cutting
American Tool Works Co., Pearl & Eggelston Aves., Cincinnati, Ohio
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Automatic Machine Co., Bridgeport, Conn.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester
Gisholt Machine Co., Madison, Wis.
Hardinge Brothers, Inc., Elmira, N. Y.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
Monarch Machine Co., Sidney, Ohio
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Sebastian Lathe Co., Cincinnati, O.
Seneca Falls Machine Co., Seneca Falls, N. Y.
South Bend Lathe Works, South Bend, Ind.
Springfield Machine Tool Co., 631 W. Southern Ave., Springfield, Ohio
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

LATHES, Toolroom
American Tool Works Co., Pearl and Eggelston Aves., Cincinnati, Ohio
Ames Co., B. C., Waltham, Mass.
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Bardons & Oliver, Inc., 1133 W. 9th St., Cleveland, O.
Boye & Emmes Machine Tool Co., Cincinnati
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio

WHERE-TO-BUY DIRECTORY

LATHES, Toolroom (Continued)
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Gisholt Machine Co., Madison, Wis.
Hardinge Brothers, Inc., Elmira, N. Y.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Lehmann Machine Co., St. Louis, Mo.
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
Monarch Machine Tool Co., The, Sidney, Ohio
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capital Ave., Hartford, Conn.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Rockford Machine Tool Co., Rockford, Ill.
Sebastian Lathe Co., Cincinnati, Ohio
Seneca Falls Machine Co., Seneca Falls, N. Y.
Sidney Machine Tool Co., Sidney, Ohio
South Bend Lathe Works, South Bend, Ind.
Springfield Machine Tool Co., The, 631 W. Southern Ave., Springfield, Ohio
Stark Tool Co., Waltham, Mass.
Steege Machy Co., Chicago, Ill.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

LATHES, Vertical Turret
Bullard Co., Canfield Ave., Bridgeport, Conn.
Foster Mach. Co., Elkhart, Ind.
General Machine Corp. (Niles Tool Works Div.), 545 Third St., Hamilton, Ohio
Goss & deLeeuw Machine Co., New Britain, Conn.
International Machine Tool Co., Indianapolis
Potter & Johnston Machine Co., Pawtucket, R. I.
Stark Tool Co., Waltham, Mass.

LATHES, Wheel Railroad
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
General Machine Corp. (Niles Tool Wks. Div.) 545 N. Third St., Hamilton, Ohio
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

LAYOUT FLUID
Dayton Rogers Co., Minneapolis, Minn.
Dykem Co., The, 2301 N. Eleventh St., St. Louis, Mo.

LEADER PINS AND BUSHINGS
U. S. Tool Co., Inc., Ampere, N. J.

LEATHER, Hydraulic
Chicago Rawhide Mfg. Co., Chicago, Ill.
Elmes Engineering Wks., Chas F., 1001 Fulton St., Chicago, Ill.
Houghton & Co., E. F., Philadelphia, Pa.
Rhoads & Sons, J. E., 35 N. Sixth St., Phila.
Watson-Stillman Co., Roselle, N. J.

LEATHER, Polishing
Chicago Rawhide Mfg. Co., Chicago, Ill.
Rhoads & Sons, J. E., 35 N. Sixth St., Philadelphia, Pa.

LEVELS, Precision
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Universal Boring Machine Co., Hudson, Mass.

LIFT TRUCK (See Trucks, Hand Lift)

LIGHT BULBS
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

LIGHTING EQUIPMENT
Acme Elec.; & Mfg. Co., 1444 Hamilton Ave., Cleveland
Adjustable Fixture Co., Milwaukee
Barkon-Frink Tube Lighting Corp., Long Island City, New York
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Curtis Lighting, Inc., 1123 W. Jackson Blvd., Chicago, Ill.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Fostoria Pressed Steel Corp., Fostoria, Ohio
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Po.

LOCK WASHERS
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Beall Tool Company, East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio
Eaton Mfg. Co., Massillon, Ohio
Hobbs Mfg. Co., Worcester, Mass.
National Lock Washer Company, Newark, N. J., and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Phila., Pa.
Positive Lock Washer Co., Newark, N. J.
S K F Industries, Inc., Front St. & Erie Ave., Phila, Pa.
Washburn Company, Worcester, Mass.

LOCKERS
Berger Mfg. Co. (Sub. of Republic Steel Corp.), Canton, Ohio
Lyon Metal Products Co., Aurora, Ill.

LUBRICANTS
Dixon Crucible Co., Jos. Jersey City, N. J.
Greene, Tweed & Co., 109 Duane St., N. Y. C.
Gulf Refining Co., Gulf Bldg., Pittsburgh
Houghton & Co., E. F., Philadelphia, Pa.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Shell Oil Corp., N. Y. C.
Socony-Vacuum Oil Co., Inc., N. Y. C.
Standard Oil Co., Inc., Chicago, Ill.
Stewart-Warner Corp., Alemite Div. Chicago
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.

LUBRICANTS (Continued)
Stuart & Co., D. A., 2727 S. Troy St., Chicago, Ill.
Texas Company, 135 E. 42nd St., New York
Tidewater Associated Oil Co., 17 Battery Place, N. Y.

LUBRICATING SYSTEMS
Bijur Lubricating Corp., 2212 43rd Ave., Long Island City, N. Y.
Bowen Products Corp., 2760 W. Warren Ave., Detroit, Mich.
Cincinnati Ball & Crank Co., Cincinnati
De Laval Separator Co., 165 Broadway, N. Y.
Gits Bros. Mfg. Co., 1846 E. Kilbourn Ave., Chicago, Ill.
Madison-Kipp Corp., Madison, Wis.
Rivett Lathe & Grinder Co. Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Speedway Mfg. Co., 1834 S. 52nd Ave., Cicero, Ill.
Stewart-Warner Corp., Alemite Div. Chicago,

MACHINE LAMPS
Fostoria Pressed Steel Corp., Fostoria, Ohio
McCrosky Tool Corp., 1340 South Main St., Meadville, Pa.

MACHINISTS' SMALL TOOLS (see Calipers, Hammers, Wrenches, Drills, Taps, etc.)

MAGNETS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cutler Hammer, Inc., 315 N. 12th St., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio
Stearns Magnetic Mfg. Co., Milwaukee, Wis.
Taft-Peirce Mfg. Co., Woonsocket, R. I.

MALLETS
Forsberg Mfg. Co., Bridgeport, Conn.
Greene, Tweed & Co., 109 Duane St., N. Y. C.

MANDRELS, Expanding
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Gisholt Machine Co., Madison, Wis.
Hanniffin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Lee & Son Co., K. O., Aberdeen, S. D.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Nicholson & Co., W. H., 114 Oregon St., Wilkes-Barre, Pa.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Tomkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.
Western Tool & Mfg. Co., Springfield, Ohio

MANDRELS, Solid
Atkins, E. C., and Co., 402 S. Illinois St., Indianapolis, Ind.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Disston & Sons, Inc., Henry, Tacony, Phila., Pa.
Gisholt Machine Co., Madison, Wis.
Michigan Tool Co., Detroit
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.
Universal Engineering Co., Frankenmuth, Mich.

MANDRELS, Solid Cemented Carbide
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.

MARKING MACHINES
Bates, H. O., Barclay St., N. Y. C.
Electro-Graphic Graver Co., Factories Bldg., Toledo, Ohio
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Noble & Westbrook Mfg. Co., 20 Westbrook St., East Hartford, Conn.
Numberall Stamp & Tool Co., Huguenot Park, Staten Island, N. Y.
Preis Engraving Machine Co., H. P., Newark, N. J.

MATERIAL HANDLING
All Steel Welded Truck Corp., Rockford, Ill.
Ready-Power Co., Detroit, Mich.

MATERIALS, Synthetic
DuPont de Nemours & Co., E. I., Wilmington, Del.

MATERIALS TESTING EQUIPMENT
American Instrument Co., Washington, D. C.

MEASURING MACHINES
Fellows Gear Shaper Co., Springfield, Vt.
Jones & Lamson Machine Co., Springfield, Vt.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., N.Y.C.
Sheffield Gage Corp., Dayton, Ohio
Triplex Mach. Tool Corp., 125 Barclay St., N. Y. C.
Van Keuren Co., The, 112 Copeland St., Watertown, Mass.

MEASURING WIRES
Van Keuren Co., 12 Copeland St., Watertown, Mass.

MECHANICS HAND TOOLS
American Swiss File & Tool Co., Elizabeth, N. J.
Lufkin Rule Co., Saginaw, Mich.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Niagara Machine & Tool Wks., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Center St., Southington, Conn.
Starrett Co., The L. S., Cresent St., Athol, Mass.

MERCURY SWITCHES
Collard, Inc., Detroit, Mich.
General Electric Vapor Lamp Co., Hoboken, N. J.
Hart Mfg. Co., Hartford, Conn.
Jefferson Electric Co., Bellwood, Ill.

MERCURY VAPOR LAMPS
General Electric Vapor Lamp Co., Hoboken, N. J.

METAL MARKING COLORS
Dykem Company, 2301 N. 11th St., St. Louis, Mo.

METAL, Perforated
Wickwire Spencer Steel Co., New York City

METAL SCRIBING PENCIL & COMPASS
Bartusch, A. P., 775 Walnut St., Lockport, N. Y.

METAL SPRAYING EQUIPMENT
Metallizing Co. of America, Inc., Los Angeles

METERS, Flow
Brown Instrument Co., Phila., Pa.

METERS, Hydrogen Ion
Coleman Elec. Co. Inc., 310 Madison St., Maywood, Ill.

MICROMETER, Internal
Bath & Co., Inc., John, 18 Grafton St., Worcester, Mass.
Federal Products Corp., 1144 Eddy St., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Randall & Stickney, Waltham, Mass.
Starrett Co., The, L. S., Cresent St., Athol, Mass.
Swedish Gage Co. of America, 7310 Woodward Ave., Detroit, Mich.
Taft-Peirce Mfg. Co., Woonsocket, R. I.

MICROMETER PLUG GAGES
Bath & Co., Inc., John, 18 Grafton St., Worcester, Mass.
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Taft-Peirce Mfg. Co., The, 32 Machanic Ave., Woonsocket, R. I.

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Federal Products Corp., 1144 Eddy St., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.
Manheim Co., Inc., K., 15 E. 26th St., N. Y. C.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
George Scherr Co. Inc., 128 Lafayette St., N.Y.C.
Slocomb Co. J. T., Providence, R. I.
Starrett Co., The, L. S., Crescent St., Athol, Mass.
Swedish Gage Co. of America, 7310 Woodward Ave., Detroit, Mich.
Van Keuren Co., The, 12 Copeland St., Watertown, Mass.

MICROSCOPES
Bausch & Lomb Optical Co., Rochester, N. Y.
Leitz, Inc., E., New York, N. Y.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Scherr Co., Geo., 128 Lafayette St., N. Y. C.

MILLING AND CENTERING MACHINES
Consolidated Mach. Tool Corp., Rochester (Newton Div.)
Jones & Lamson Machine Co., Springfield, Vt.

MILLING ATTACHMENTS
Adams Co., East Fourth St., Dubuque, Ia.
Bridgeport Pattern and Model Works, Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cincinnati Milling Machine Co., Cincinnati, Ohio
DeVlieg Milling Machine Co., Jackson, Mich.
Ingersoll-Rand Co., 11 Broadway, New York
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.
Kingsbury Machine Tool Co., Keene, N. H.
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Stark Tool Co., Waltham, Mass.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wis.
Van Norman Machine Tool Co., Springfield, Mass.

MILLING CUTTERS (see Cutters Milling)

MILLING MACHINE DRIVES
Chicago Rawhide Mfg. Co., Chicago, Ill.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Cullman Wheel Co., Chicago, Ill.
Dayton Rubber Mfg. Co., Dayton, Ohio
DeVlieg Milling Machine Co., Jackson, Mich.
Hardinge Brothers, Inc., Elmira, N. Y.
Ingersoll Milling Machine Co., Rockford, Ill.

MILLING MACHINES, Automatic
American Machine Tool Co., Hackettstown, N. J.
Automatic Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester
DeVlieg Milling Machine Co., Jackson, Mich.
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Kent-Owens Machine Co., 958 Wall St., Toledo

WHERE-TO-BUY DIRECTORY

MILLING MACHINES, Automatic (Continued)
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Potter & Johnston Machine Co., Pawtucket, R. I.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Sundstrand Machine Tool Co., Rockford, Ill.
U. S. Tool Co., Inc., Ampere, N. J.

MILLING MACHINES, Bench
Ames Co., B. C., Waltham, Mass.
Hardinge Brothers, Inc., Elmira, N. Y.
Link Engrg. & Mfg. Co., 1054 W. Baltimore Ave., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Product Machine Co., Bridgeport, Conn.
Stark Tool Co., Waltham, Mass.

MILLING MACHINES, Continuous
Consolidated Machine Tool Corp., Rochester, N. Y. (Newton Div.)
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
General Machinery Corp. (Niles Tool Wks. Div), 545 N. Third St., Hamilton, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Sundstrand Machine Tool Co., Rockford, Ill.
U. S. Tool Co. Inc., Ampere, N. J.

MILLING MACHINES, Duplex
Cincinnati Milling Machine Co., Cincinnati.
Cochrane-Bly Co., 15 St. James Pl., Rochester
Consolidated Machine Tool Corp., Rochester
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Defiance Machine Works, Defiance, Ohio
DeVlieg Milling Machine Co., Jackson, Mich.
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Sundstrand Machine Tool Co., Rockford, Ill.
Taylor & Fenn Co., The, 54 Arch St., Hartford

MILLING MACHINES, Floor Type
Consolidated Machine Tool Corp., Rochester
DeVlieg Milling Machine Co., Jackson, Mich.
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Giddings & Lewis Machine Tool Co., 142 Doty St., Fond du Lac, Wis.
Ingersoll Milling Machine Co., Rockford, Ill.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wis.

MILLING MACHINES, Hand
Automatic Mach. Co., 113 E. Washington Ave., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R. I.
Frew Machine Co., 126 W. Venango St., Philadelphia, Pa.
Kent-Owens Machine Co., Toledo, Ohio
Miller & Crowningshield, Greenfield, Mass.
Nichols, W. H., Waltham, Mass.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Stark Tool Company, Waltham, Mass.
Sundstrand Machine Tool Co., Rockford, Ill.
Van Norman Machine Tool Co., Springfield, Mass.

MILLING MACHINES, Plain
Cincinnati Milling Machine Co., Cincinnati, Ohio
Brown & Sharpe Mfg. Co., Providence, R. I.
DeVlieg Milling Machine Co., Jackson, Mich.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.
Kent-Owens Machine Co., Toledo, Ohio
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Sidney Machine Tool Co., Sidney, Ohio
Steege Machy Co., Chicago, Ill.

MILLING MACHINES, Planer Type
Cincinnati Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y. (Newton Div.)
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Giddings & Lewis Machine Tool Co., 142 Doty St., Fond du Lac, Wis.
Gray Co., The, G. A., 3611 Woodburn Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wis.

MILLING MACHINES, Profile
Automatic Machine Company, Bridgeport, Conn.
Consolidated Machine Tool Corp., Rochester, N. Y. (Newton Div.)
Frew Machine Co., 126 West Venango St., Philadelphia, Pa.

MILLING MACHINES, Profile (Continued)
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.

MILLING MACHINES, Thread
Adams Company, East Fourth St., Dubuque, Iowa
Automatic Machine Company, Bridgeport, Conn.
Grob Bros., West Allis, Wis.
Hall Planetary Co., Fox St., Philadelphia
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Lees-Bradner Co., 6210 Carnegie Ave., Cleveland, Ohio
Marburg Brothers, Inc., 90 West St., N. Y. C.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Scherr Co., Inc., Geo., 128 Lafayette St., N.Y.C.
Taft-Pierce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Waltham Machine Works, Waltham, Mass.

MILLING MACHINES, Universal
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Cochrane-Bly Co., 15 St. James St., Rochester
Gorton Machine Co., George, 1103 13th St., Racine, Wis.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.
Knight Machinery Co., W. B., 3620 W. Pine Blvd., St. Louis, Mo.
Preis Engraving Mach. Co., H. P., 155 Summit St., Newark, N. J.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Sidney Machine Tool Co., Sidney, Ohio
Steege Machy. Co., Chicago, Ill.
Van Norman Machine Tool Co., 160 Wilbraham Ave., Springfield, Mass.

MILLING MACHINES, Vertical
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Clough, R. M., Meriden, Conn.
Cochrane-Bly Co., 15 St. James Pl., Rochester
Consolidated Machine Tool Corp., Rochester, N. Y. (Newton Div.)
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Gorton Machine Co., George, 1103 13th St., Racine, Wis.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., 6784 West National Ave., Milwaukee, Wis.
Knight Machinery Co., W. B., 3920 W. Pine Blvd., St. Louis, Mo.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Sidney Machine Tool Co., Sidney, Ohio
Stark Tool Co., Waltham, Mass.
Sundstrand Machine Tool Co., Rockford, Ill.
Taylor & Fenn Co., The, 54 Arch St., Hartford, Conn.

MILLING UNITS, Self-Contained Motor Drive
Barnes, W. F. & John, Rockford, Ill.
Consolidated Mach. Tool Corp., Rochester (Newton Div.)
Dalrae Tools Co., 313 Syracuse Bldg., Syracuse, N. Y.
DeVlieg Milling Machine Co., Jackson, Mich.
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
Foote-Burt Co., The, 13000 St., Clair Ave., Cleveland, Ohio
Greenlee Bros. & Co., Twelfth Street and Columbia Ave., Rockford, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Millholland Sales & Mach Co., 936 E. Georgia St., Indianapolis, Ind.
National Automatic Tool Co., South 7th and N Sts., Richmond, Ind.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

MILLIVOLTMETERS
Brown Instrument Co., Phila., Pa.

MILLS, Hollow (see Cutters, Milling)

MOLDERS BENCHES AND VIBRATORS
Western Tool and Mfg. Co., Springfield, Ohio
Colt's Patent Fire Arms Mfg. Co., Hartford

MOLDING MACHINES
Adams Company, East 4th St., Dubuque, Iowa
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio
Stokes Mach. Co., F. J., 5930 Tabor rd., Phila.

MOLDING MATERIALS, Phenolic
Bakelite Corp., Bound Brook, N. J.

MOLYBDENUM
Climax Molybdenum Corp., 500 5th Ave., N. Y. C.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.

MONORAIL (see Tramrail)

MORTISING CHAIN
Boston Gear Works, Inc., North Quincy, Ill.

MOTOR GENERATORS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Diehl Mfg. Co., Elizabethport, N. J.

MOTOR GENERATORS (Continued)
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Janette Mfg. Co., 556 W. Monroe St., Chicago
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

MOTORS, Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baldor Electric Co., 4357 Duncan Ave., St. Louis, Mo.
Black & Decker Mfg. Co., Towson, Md.
Bodine Electric Co., 2264 W. Ohio St., Chicago
Century Electric Co., St. Louis, Mo.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Diehl Mfg. Co., Elizabethport, N. J.
Dunmore Co., The, 14th St., Racine, Wis.
Emerson Electric Mfg. Co., 2001 Washington Ave., St. Louis, Mo.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Forbes & Myers, 170 Union St., Worcester, Mass.
General Electric Co., Schenectady, N. Y.
Janette Mfg. Co., 556 W. Monroe St., Chicago, Ill.
Lincoln Electric Co., Cleveland, Ohio
Marathon Elec. Mfg. Corp., Wausau, Wis.
Reliance Elec. and Engrg. Co., 1058 Idaho Road, Cleveland, Ohio
Speedway Mfg. Co., 1834 So. 52nd Ave., Cicero, Ill.
Sterling Electric Motors, Telegraph Road, Los Angeles, Calif.
U. S. Electrical Motors Inc., Los Angeles, Calif.
Wagner Electric Corp., 6144 Plymouth Ave., St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

MOULD DRESSING
St. John X-Ray Service, Inc., 30 Thomson Ave., Long Island City, N. Y.

MUFFLE FURNACES, High Speed
American Gas Furnace Co., Elizabeth, N. J.
Stark Tool Co., Waltham, Mass.
Surface Combustion Corp., Toledo, Ohio

MULTI-SLIDE MACHINES
U. S. Tool Co., Inc., Ampere, N. J.

NAILS
Conklin Brass & Copper Co., Inc., T. E., 54 Lafayette St., New York City

NAILS, Foundry
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.

NAMEPLATES
Bates, H. O., Barclay St., N. Y. C.
Crowe Name Plate & Mfg. Co., 1749 Grace St., Chicago, Ill.

NIBBLING MACHINES
Andrew C. Campbell Division (Amer. Chain & Cable Co., Inc.), 929 Bridgeport, Conn.
Gray Mach. Co., Box 596, Phila, Pa.
International Nickel Co. Inc., 67 Wall St., N. Y. C.
Mitts & Merrill, 913 Tilden St., Saginaw, Mich.
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.

NICKEL
Driver-Harris Co., Harrison, N. J.

NITROGEN
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
Linde Air Products Co., Inc., 30 E. 42nd St., New York City
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

NOZZLES, Blast Cleaning
American Foundry Equipment Co., Mishawaka, Ind.
Binks Mfg. Co., 3114 Carroll Ave., Chicago
DeVilbiss Company, 300 Phillips Ave., Toledo, O.
Norton Company, Worcester, Mass.

NOZZLES, Spray
DeVilbiss Company, 300 Phillips Ave., Toledo, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago
Saylor Beall Mfg. Co., Detroit, Mich.
Spray Engineering Co., 114 Central St., Somerville, Mass.

NUMBERING MACHINES
Bates, H. O., Barclay St., N. Y. C.
Noble & Westbrook Mfg. Co., 20 Westbrook St., East Hartford, Conn.
Numberall Stamp & Tool Co., Huguenot Park, Staten Island, N. Y.

NUT BLANKING MACHINES
National Acme Co., 170 E. 131st St., Cleveland
National Machinery Co., Tiffin, Ohio
Potter & Johnston Machine Co., Pawtucket, R. I.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Windsor Automatic Co., Inc., Depot Ave., Windsor, Vt.

NUT SETTING EQUIPMENT
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Black & Decker Mfg. Co., 716 Pennsylvania Ave., Towson, Md.
Buckeye Portable Co., 20 West Apple St., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Clark Jr., Elec. Co., James, 600 Bergman St., Louisville, Ky.
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.

WHERE-TO-BUY DIRECTORY

NUT SETTING EQUIPMENT (Continued)
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Strand Co., N. A., 5001 No. Lincoln St., Chicago, Ill.
Tompkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
U. S. Electrical Tool Co., 2489 W. Sixth St., Cincinnati, O.
Van Lorn Electric Tool Co., 716 Joppa Road, Towson, Md.

NUT TAPPERS (See Bolt and Nut Machinery)
National Acme Co., Cleveland, Ohio
National Machinery Co., Tiffin, Ohio
Waterbury Farrel Foundry & Mach. Co., Waterbury, Conn.

OIL AND GREASE CUPS
Bowen Products Corp., 2760 W. Warren Ave., Detroit, Mich.
Gits Bros. Mfg. Co., 1846 So. Kilbourn Ave., Chicago, Ill.
Stewart-Warner Corp., Alemite Div., Chicago

OIL EXTRACTORS, Centrifugal
DeLavel Separator Co., 165 Bway, N. Y. C.

OIL GROOVING ATTACHMENTS
Hansom-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
National Machine Tool Co., 2272 Spring Grove Ave., Cincinnati, Ohio

OIL GROOVING MACHINES
Defiance Machine Works, Defiance, Ohio
Fischer Machine Co., 310 N. 11th St., Phila.
Wicaco Machine Corp., Stenton Ave., Phila.

OIL PURIFIERS
DeLavel Separator Co., 165 Bway, N. Y. C.

OIL SEALS
Chicago Rawhide Mfg. Co., Chicago, Ill.
Felters Co., Inc., South St., Boston, Mass.
Gits Bros. Mfg. Co., 1846 So. Kilbourn Ave., Chicago, Ill.
National Motor Bearings Co., 1100 78th Ave., Oakland, Calif.

OILERS, Automatic
Bijur Lubricating Corp., 4301-22nd, Long Island City, N. Y.
Bowen Products Corp., 7260 W. Warren Ave., Detroit, Mich.
Gits Bros. Mfg. Co., 1846 So. Kilbourn Ave., Chicago, Ill.
Rivett Lathe & Grinder Inc., Brighton, Boston, Mass.
Speedway Mfg. Co., 1834 So. 52d Ave., Cicero, Ill.
Stewart-Warner Corp., Alemite Div., Chicago

OILS, Cutting
Gulf Refining Co., Gulf Bldg., Pittsburgh, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
National Oil Prod. Co., Harrison, N. J.
Oster Mfg. Co., The, 2057 East 61st Place, Cleveland, Ohio
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Shell Oil Corp., N. Y. C.
Socony-Vacuum Oil Co., New York, N. Y.
Standard Oil Co., 910 S. Michigan Ave., Chicago
Stuart Oil Co., D. A., 2727 So. Troy St., Chicago, Ill.
Sulfo Corp. of America, 701 Spring St., Elizabeth, N. J.
Sun Oil Co., Philadelphia, Pa.
Swan-Finch Oil Corp., 30 Rockerfeller Plaza, N. Y. C.
Texas Co., 135 E. 42nd St., New York
Tidewater Associated Oil Co., 17 Battery Place, N. Y.

OILS, Lubricating
Gulf Refining Co., Gulf Bldg., Pittsburgh, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Socony-Vacuum Oil Co., New York, N. Y.
Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.
Stewart-Warner Corp., Alemite Div., Chicago
Stuart Oil Co., D. A., 2727 So. Troy St., Chicago, Ill.
Sun Oil Co., Philadelphia, Pa.
Swan-Finch Oil Corp., 30 Rockerfeller Plaza, N. Y. C.
Texas Co., 135 E. 42nd St., New York
Tidewater Oil Co., 17 Battery Place, N. Y.

OILS, Quenching and Tempering
Gulf Refining Co., Gulf Bldg., Pittsburgh, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Socony-Vacuum Oil Co., New York, N. Y.
Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.
Stuart Oil Co., D. A., 2727 So. Troy St., Chicago, Ill.
Sun Oil Co., Philadelphia, Pa.
Swan-Finch Oil Corp., 30 Rockerfeller Plaza, N. Y. C.
Texas Co., 135 E. 42nd St., New York

OPTICAL INSPECTION AND GAGING MACHINES (Comparator)
Jones & Lamson Machine Co., Springfield, Vt.
George Scherr Co., Inc., 128 Lafayette St., New York
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Triplex Machine Tool Corp., 125 Barclay St., N. Y. C.
Van Keuren Co., 12 Copeland St., Watertown, Mass.

OPTICAL PROTRACTORS
Bausch & Lomb Optical Co., 702 St. Paul St., Rochester, N. Y.
Scherr Co., Inc., Geo., 128 Lafayette St., N.Y.C.

OVENS
Despatch Oven Co., 622-9th St., S. E. Minneapolis, Minn.

OXYGEN
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
Linde Air Products Co. Inc., 30 E. 42nd St., N. Y. C.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

PACKAGING MACHINERY
Signode Steel Stripping Co., 2600 Northwester Ave., Chicago

PACKING, Asbestos, Cotton, Felt, etc.
Felters Co., Inc., 210 South St., Boston, Mass.
Goodrich Company B. F., Akron, Ohio
Greene, Tweed & Co., 109 Duane St., N. Y. C.
Johns-Manville, 22 E. 40th St., N. Y. C.
Republic Rubber Co., Youngstown, Ohio

PACKING, Hydraulic
Chicago Rawhide Mfg. Co., Chicago, Ill.
Elmes Engineering Wks., Chas F., 1001 Fulton St., Chicago, Ill.
B. F. Goodrich Co., 576 South Main St., Akron, Ohio
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Greene, Tweed & Co., 109 Duane St., N. Y. C.
Houghton & Co., E. F., Philadelphia, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Johns-Manville, 22 E. 40th St., N. Y. C.
Keckly, O. C., 567 Washington Blvd., Chicago.
Rhoads & Sons, J. E., 35 North Sixth St., Philadelphia, Pa.
Seamless Steel Equipment Corp., 39 Broadway, New York City
Watson-Stillman Co., Roselle, N. J.

PAINT, Heat Indicating
Efkalin Co., 804 E. 141st St., N. Y. C.

PAINTING EQUIPMENT, Spray
Binks Mfg. Co., 3114 Carroll Ave., Chicago
DeVilbiss Co., Toledo, Ohio
Ideal Commutator Dresser Co., Sycamore, Ill.
Quigley Co., Inc., 56 W. 45th St., N. Y. C.

PAINTS
Sherwin-Williams Co., 101 Prospect Ave., Cleveland

PAINTS, Acid and Alkali Resistant
American Coppercote Inc., 480 Lexington Ave., New York
Bakelite Corp., Bound Brook, N. J.
Collard Inc., Detroit, Mich.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Hague & Co., Inc., Alfred 227 34th St., Brooklyn, N. Y.
Houghton & Co., E. F., Philadelphia, Pa.
Maas & Walstein, Newark, N. J.
Quigley Co., Inc., 56 W. 45th St., N. Y. C.
Roxalin Flexible Lacquer Co., Box A, Elizabeth, N. J.
Socony-Vacuum Oil Co., New York, N. Y.
Wet-N-Hale Paint Compound Co., 572 Greenwich St., N. Y. C.

PARALLELS
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.
Starrett Co., The L. S., Crescent St., Athol, Mass.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Vinco Tool Co., 7350 Central Ave., Detroit
Walker & Co., Inc., O. S., Worcester, Mass.

PATTERN METAL, Low Temperature Melting
Cerro de Pasco Copper Corp., 44 Wall St., N.Y.C.

PERFORATING DIES, Adjustable
Gerstner and Sons, H., 138 Columbia St., Dayton, Ohio
Whistler & Sons, S. B., Inc., 752 Military Rd., Buffalo, N. Y.

PHOSPHOR BRONZE (see Alloys, Phosphor Bronze)

PHOTO ELECTRIC CELLS
Continental Electric Co., Geneva, Ill.

PICKLING BARRELS
Ransohoff, Inc., N., Cartage, Cincinnati, O.

PICKLING MACHINES
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Ransohoff Inc., N., W. 71st St., Carthage, Cincinnati, Ohio

PILLOW BLOCKS
Ahlberg Bearing Co., 3025 W. 47th St., Chicago
Boston Gear Works, Inc., North Quincy, Mass.
Dodge Mfg. Corp., Mashawaka, Ind.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Fafnir Bearing Co., New Britain, Conn.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Link-Belt Co., 2410 W. 18th St., Chicago
Norma-Hoffman Bearings Corp., Stamford, Conn.
Palmer-Bee Co., Westminister & G. T. R. R., Detroit, Mich.
Randall Graphite Products Co., 609 W. Lake St., Chicago
Royersford Fdry. & Mach. Co. Inc., Royersford, Pa.
S. K. F. Industries, Inc., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
Smith, Inc., Winfield H., Springville, Erie County, N. Y.

PINIONS (see Gears)

PIPE, Acid Resisting
Haynes Stellite Co., Harrison & Lindsay St., Kokomo, Ind.

PIPE, Acid Resisting Non-Metalic
Continental Diamond Fibre Co., Newark, Del.

PIPE, Brass and Copper
American Brass Co., Waterbury, Conn.
Conklin Brass & Copper Co., Inc., T. E., 54 Lafayette St., N. Y. C.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

PIPE CUTTERS, Hand
Greenfield Tap & Die Corp., Greenfield, Mass.
Ridge Tool Co., Elyria, Ohio

PIPE CUTTING AND THREADING MACHINES
Beaver Pipe Tools Inc., 1937 Amma Ave., Warren, Ohio
Landis Machine Co., Inc., Church and 5th Sts., Waynesboro, Pa.
Merrell Mfg. Co., 100 Curtis St., Toledo, Ohio
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
National Acme Co., 170 E. 31st St., Cleveland
Oster Mfg. Co., The, 2057 E. 61st Pl., Cleveland
Peerless Machine Co., 1615 Racine St., Racine, Wis.
Pipe Machinery Co., The 930 E. 70th St., Cleveland, Ohio
Ryerson & Co., Inc., Jos T., 16th and Rockwell Sts., Chicago, Ill.
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo, Ohio
United Engrg. & Fdry. Co., Pittsburgh, Pa.

PIPE FITTERS' TOOLS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.

PIPE PLUGS
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Strong Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio
Watson-Stillman Co., Roselle, N. J.

PIPE PLUGS, Socket
Allen Mfg. Co., Hartford, Conn.
Bristol Co., Waterbury, Conn.
Holo-Krome Screw Corp., Hartford, Conn.
Standard Pressed Steel Co., Jenkintown, Pa.

PIPE STEEL
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Co., 1802 Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio

PLANER ATTACHMENT
Adams Company, E. 4th St., Dubuque, Iowa
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cincinnati Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Gray Co., The, G. A., 3611 Woodburn Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.

PLANERS, Open Side
Automatic Machine Company, Bridgeport, Conn.
Cincinnati Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Cleveland Planer Co., 3148 Superior Ave., Cleveland, Ohio
General Machinery Corp., (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Gray Co., G. A. The, 3611 Woodburn Ave., Cincinnati, Ohio
Rockford Machine Tool Co., Rockford, Ill.
Sellers & Co., Inc., William 1600 Hamilton St., Philadelphia, Pa.

PLANERS, Switch and Frog
Cincinnati Planer Co., 3120 Forrer St., Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y. (Betts Div.)
General Machinery Corp., (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Gray Co., G. A. The, 3611 Woodburn Ave., Cincinnati, Ohio
Sellers & Co., Inc., William 1600 Hamilton St., Philadelphia, Pa.

PLANING MACHINES
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Cincinnati Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Cleveland Punch & Shear Works Co. E. 40th and Saint Clair Ave., Cleveland, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y. (Betts Div.)
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Gray Co., G. A., The, 3611 Woodburn Ave., Cincinnati, Ohio
Niles Tool Works Co., Hamilton, Ohio
Ohio Machine Tool Co., Kenton, Ohio
Rockford Machine Tool Co., Kishwaukee St., Rockford, Ill.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

PLASTIC PRODUCTS
Bakelite Corp., Bound Brook, N. J.
Colts Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., Hartford, Conn.
Continental Diamond Fibre Co., Newark, Del.
Cutler Hammer Inc., Milwaukee, Wis.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio

WHERE-TO-BUY DIRECTORY

PLASTIC PRODUCTS (Continued)
General Plastics Inc., North Tonawanda, N. Y.
Synthane Corp. Oaks, Pa.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

PLATE PLANERS
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland, O.
Consolidated Mach. Tool Corp., Rochester (Hilles & Jones Div.)
General Machinery Corp. (Niles Tool Wks. Div.), 545 Third St., Hamilton, Ohio
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

PLATES, Floor
Carnegie-Illinois Steel Corp., Pittsburg, Pa.
Ryerson & Co., Inc., Jos., T., 16th and Rockwell Sts., Chicago, Ill.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

PLATES, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburg, Pa.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburg, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Universal Steel Co., Bridgeville, Pa.

PLATFORMS, Skid
All Steel Welded Truck Corp., 1139 Railroad Ave., Rockford, Ill.
Automatic Transportation Co., 59 W. 87th St., Chicago, Ill.
Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill.
Eastern Car & Construction Co., Easton, Pa.
Lyron Iron Works, 71 Madison St., Greene, N. Y.
Powell Pressed Steel Co., Hubbard, Ohio
Sabin Machine Co., 6538 Carnegie Ave., Cleveland, O.
Standard Pressed Steel Co., Jenkintown, Pa.
Yale & Towne Mfg. Co., Philadelphia, Div., 4530 Tacony St., Philadelphia, Pa.

PLATING, Chromium
Pratt & Whitney, Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.

PLATING EQUIPMENT
Crown Rheostat & Supply Co., Chicago, Ill.
Hanson, Van Winkle & Munning Co., Matawan, N. J.
Meuker Company, 1629 S. 55th Ave., Chicago
Munning & Munning, Inc., 202 Emmett St., Newark, N. J.
Ransonoff, Inc., N. W. 71st St., Carthage, Cincinnati, O.
Udylite Co., 1651 E. Grand Blvd., Detroit, Mich.

PLUMB BOBS
American Swiss File & Tool Co., 400 Trumbull St., Elizabeth, N. J.

POINTS, Center
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.

POLISHING AND BUFFING MACHINES
Acme Mfg. Co., 1645 Howard St., Detroit, Mich.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Cleveland Elec. Motor Co., 5212 Chester Ave., Cleveland, Ohio
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Diehl Mfg. Co., Elizabethport, N. J.
Excelsior Tool & Machine Co., East St. Louis, Ill.
Gardner Machine Co., 410 E. Gardner St., Beloit, Wis.
Hammond Machinery Bldrs., Inc., Kalamazoo, Mich.
Hisey-Wolf Machine Co., The, Marshall and Colerain Aves., Cincinnati, Ohio
Landis Tool Co., Waynesboro, Pa.
Mall Tool Co., 7740 S. Chicago Ave., Chicago
Marathon Elec. Mfg. Corp., Wausau, Wis.
Mattison Machine Works, Rockford, Ill.
Mico Instrument Co., 10 Arrow St., Cambridge
Packer Machine Co., Chas., Meriden, Conn.
Pratt & Whitney Div. Noles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Machine Co., Greenfield, Mass.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Stow Mfg. Co., Inc., 443 State St., Binghamton, N. Y.
U. S. Electrical Tool Co., 2439 W. Sixth St., Cincinnati, O.
Walker-Turner Co., Inc., 639 South Ave., Plainfield, N. J.

POLISHING AND BUFFING MACHINES, Portable
Black & Decker Mfg. Co., Towson, Md.
Buckeye Portable Tool Co., 29 W. Apple St., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Hammond Machinery Bldrs., Inc., Kalamazoo, Mich.

POLISHING AND BUFFING MACHINES, Portable (Continued)
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Hisey-Wolf Machine Co., The, Marshall and Colerain Aves., Cincinnati, Ohio
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Strand Co., N. A., 5001 No. Lincoln St., Chicago, Ill.
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.
Stow Mfg. Co., Inc., 443 State St., Binghamton, N. Y.
Swartz & White Mfg. Co., 25 Washington St., Binghamton, N. Y.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Walker-Turner Co., Inc., 639 South Ave., Plainfield, N. J.

POLISHING COMPOUNDS
Carborundum Co., Niagara Falls, N. Y.
Socony-Vacuum Oil Co., New York, N. Y.

POLISHING GRAINS, Abrasive
Abrasive Company, Tacony & Fraley Sts., Phila.
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

PORTABLE TOOLS (See Portable Drilling and Grinding Machines, Etc.)

PORTABLE TOOLS, Electric
Black & Decker Mfg. Co., Towson, Md.
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.
Cincinnati Electrical Tool Co., Madison & Edwards Rds., Cincinnati, O.
Hisey-Wolf Mach. Co., Colerain Ave., Cincinnati
Stow Mfg. Co., Inc., 443 State St., Binghamton, N. Y.

POTENTIOMETERS
Brown Instrument Co., Phila., Pa.

POTS, Cyanide, Salt & Lead
Eclipse Fuel Engrg. Co., 701 S. Main St., Rockford, Ill.
General Alloys Co., 3667 W. 1st St., Boston, Mass.

POTS, Glue
Black & Decker Mfg. Co., Towson, Md.
Francis Co., Chas. E., Rushville, Ind.

POTS, Melting
American Manganese Steel Div., 389 E. 14th St., Chicago Heights, Ill.
Calorizing Co., Wilkinsburg Sta., Pittsburgh, Pa.
Driver-Harris Co., Harrison, N. J.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Miac Products Co., 129 E. Woodland Ave., Fort Wayne, Ind.
Strong, Carlisle & Hammond Mach. Co., Cleveland, Ohio

POTS, Pressed Steel
Bellis Heat Treating Co., Branford, Conn.

PREFORMING PRESSES
Kux-Lohner Mach. Co., 2145 Lexington St., Chicago

PRESS BRAKES
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works Co., E. 40th and St. Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, Ohio
Dreis & Krump Mfg. Co., 7406 Loomis Blvd., Chicago, Ill.
Henderson Machine Co., 5023 Germantown Ave., Philadelphia, Pa.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Strippit Corp., 1559 Niagara St., Buffalo, N. Y.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Whitney Metal Tool Co., Rockford, Ill.

PRESS FEEDS
Bliss, E. W., Co., Brooklyn, N. Y.
Federal Press Co., Elkhart, Ind.
Henderson Machine Co., 5023 Germantown Ave., Philadelphia, Pa.
Henry & Wright Mfg. Co., 760 Windsor St., Hartford, Conn.
Littell Machine Co., F. J., 4127 Ravenswood Ave., Chicago, Ill.
Perkins Machine Co., Warren, Mass.
U. S. Tool Co., Inc., Ampere, N. J.
V. & O. Press Co., The, Union Turnpike, Hudson, N. Y.
Walsh Press & Die Co., 4709 W. Kinzie St., Chicago, Ill.
Waterbury Farrel Foundry & Mach. Co., Waterbury, Conn.
Zeh & Hahnemann Co., 180 Vanderpool St., Newark, N. J.

PRESS GUARDS
Humm Tool & Mach. Co., 253 Sheffield Ave., Brooklyn, N. Y.

PRESSES, Arbor
A. B .C. Products, 11952 Montana Ave., West Los Angeles, Calif.
Atlas Press Co., 1849 N. Pitcher St., Kalamazoo, Mich.
Barnes Co., W. F. & John, Rockford, Ill.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Chambersburg Engineering Co., Chambersburg, Pa.
Champion Blower & Forge Co., Lancaster, Pa.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.

PRESSES, Arbor (Continued)
Faribault Mach. Shop & Ddry. Fourth St., Faribault, Minn.
Greenerd Arbor Press Co., 41 Crown St., Nashua, N. H.
Hack Machine Co., 440 N. Oakley Blvd., Chicago, Ill.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Keckley Co., O. C., 567 Washington Blvd., Chicago
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Logansport Machine Inc., Logansport, Ind.
Nicholson & Co., W. H., 114 Oregon St., Wilkes-Barre, Pa.
Partool Mach. Co., 9111 Schaefer Rd., Detroit
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Smith, Inc., Winfield H., Springville, Erie County, N. Y.
Tompkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Watson-Stillman Co., Roselle, N. J.

PRESSES, Broaching
American Broach & Mach. Co. (Div. of Sundstrand Mach. Tool Co.), Ann Arbor, Mich.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
General Mfg. Co., 6436 Farnsworth Ave., Detroit, Mich.
Greenerd Arbor Press Co., Nashua, N. H.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Keckley Co., O. C., 567 Washington Blvd., Chicago
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.
Watson-Stillman Co., Roselle, N. J.

PRESSES, Drop (see Hammers, Drop)
Peck, Stow & Wilcox Co., Southington, Conn.

PRESSES, Foot
Baird Machine Co., Bridgeport, Conn.
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Peck, Stow & Wilcox Co., Center St., Southington, Conn.
Perkins Machine Co., Warren, Mass.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Taylor and Fenn Co., 54 Arch St., Hartford
V. & O. Press Co., Union Turnpike, Hudson, N. Y.
Walsh Press & Die Co., 4709 W. Kinzie St., Chicago, Ill.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

PRESSES, Forcing
Barnes Co., W. F. & John, Rockford, Ill.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Dudgeon, Inc., Richard, 24 Columbia St., N. Y. C.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
General Manufacturing Co., 6430 Farnsworth Ave., Detroit, Mich.
Greenerd Arbor Press Co., 41 Crown St., Nashua, N. H.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Keckley, O. C., 567 Washington Blvd., Chicago
Lake Erie Engrg. Corp., Kenmore Sta., Buffalo, N. Y.
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Watson-Stillman Co., Roselle, N. J.
Williams, White & Co., Moline, Ill.
Wood Company, R. D., Philadelphia, Pa.

PRESSES, Forging
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
Alliance Mach. Co., 200 Mahoning Ave., Alliance, O.
Bliss Co., E. W., Brooklyn, N. Y.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, Ohio
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Henderson Machine Co., 5023 Germantown Ave., Philadelphia, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Keckley, O. C., 567 Washington Blvd., Chicago
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Morgan Engrg. Co., Alliance, O.
National Machinery Co., Greenfield St., Tiffin, Ohio
Perkins Machine Co., Warren, Mass.
Robertson Co., John, 121 Water St., Brooklyn, N. Y.
Walsh Press & Die Co., 4709 W. Kinzie St., Chicago, Ill.

WHERE-TO-BUY DIRECTORY

PRESSES, Forging (Continued)
Watson-Stillman Co., Roselle, N. J.
Williams, White & Co., Moline, Ill.
Wood Company, R. D., Philadelphia, Pa.
Zeh & Hahnemann Co., Vanderpool St., Newark, N. J.

PRESSES, Hand Screw
Francis Co., Chas. E., Rushville, Ind.
Perkins Mach. Co., Warren, Mass.
Wright Mfg. Div. Amer. Chain Co., Inc., Bridgeport, Conn.
Zeh & Hahnemann Co., Vanderpool St., Newark, N. J.

PRESSES, Hydraulic
Alliance Mach. Co., 200 Mahoning Ave., Alliance, O.
American Broach Machine Co., 415 W. Huron St., Ann Arbor, Mich.
Atlas Press Co., 1849 N. Pitcher St., Kalamazoo, Mich.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W., Brooklyn, N. Y.
Buckeye Iron & Brass Works, 326 E. 3rd St., Dayton, Ohio
Burroughs Engrg. Co., Clinton & Beaver Sts., Newark, N. J.
Chambersburg Engineering Co., Chambersburg, Pa.
Davis Keyseater Co., 399 Exchange St., Rochester, N. Y.
Defiance Machine Works, Defiance, Ohio
Dudgeon Inc., Richard, 24 Columbia St., N. Y. C.
Dunning & Boschert Press Co., Inc., 390 W. Water St., Syracuse, N. Y.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farquhar Co., Ltd., A. B., York, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Francis Co., Charles E., Rushville, Ind.
French Oil Mill Machy. Co., Piqua, O.
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Greenerd Arbor Press Co., 41 Crown St., Nashua, N. H.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Keckley, O. C., 567 Washington Blvd., Chicago
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Logansport Machine Inc., Logansport, Ind.
Marburg Brothers, Inc., 90 West St., N. Y. C.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engrg. Co., Alliance, O.
National Broach & Mach. Co., Detroit
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.
Partool Mach. Co., 9111 Schaefer Rd., Detroit
Progressive Welder Co., 737 Piquette Ave., Detroit, Mich.
Robertson Co., John, 121 Water St., Bklyn., N. Y.
Schloemann Engrg. Co., Empire Bldg., Pittsburgh
Seamless Steel Equipment Corp., 39 Broadway, New York City
Toledo Mach. & Tool Co., Toledo, O.
Vulcan Iron Works, 327 N. Irving Ave., Chicago
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Watson-Stillman Co., Roselle, N. J.
West Tire Setter Co., 399 Exchange St., Rochester, N. Y.
Williams, White & Co., Moline, Ill.
Wood Company, R. D., Philadelphia, Pa.
Wright Mfg. Div. Amer. Chain Co. Inc., Bridgeport, Conn.

PRESSES, Power
Allsteel Press Co., Chicago, Ill.
Automatic Machine Company, Bridgeport, Conn.
Ams Machine Co., Max, Bridgeport, Conn.
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Clearing Mach. Co., 6499 W. 65th St., Chicago, Ill.
Cleveland Planer Co., 3148 Superior Ave., Cleveland, Ohio
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, Ohio
Davis Keyseater Co., 399 Exchange St., Rochester, N. Y.
Dreis & Krump Mfg. Co., 7406 Loomis Blvd., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Federal Press Co., Elkhart, Ind.
Ferracute Machine Co., Bridgeton, N. J.
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Francis Co., Chas. E., W. Fifth St., Rushville, Ind.
General Manufacturing Co., 6430 Farnsworth Ave., Detroit, Mich.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Henderson Machine Co., 5032 Germantown Ave., Philadelphia, Pa.

PRESSES, Power (Continued)
Henry & Wright Mfg. Co., 760 Windsor St., Hartford, Conn.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Loshbough-Jordan Tool & Machine Co., Elkhart, Ind.
Marburg Brothers, Inc., 90 West St., N. Y. C.
Marshalltown Mfg. Co., Marshalltown, Iowa
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
New Albany Mach. Mfg. Co., New Albany, Ind.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.
Pels and Co., Henry, New York, N. Y.
Rockford Iron Works, 648 Race St., Rockford, Ill.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Standard Machy. Co., 1600 Elmwood Ave., Providence, R. I.
Steege Mach. Co., Chicago, Ill.
Super Speed Press Corp., Reading, Pa.
Taylor & Fenn Co., The, 54 Arch St., Hartford
Thomas Machine Mfg. Co., Pittsburgh, Pa.
Thomas Spacing Machine Co., Pittsburgh, Pa.
Toledo Mach. & Tool Co., Toledo, O.
United Engrg. & Foundry Co., Pittsburgh, Pa.
V. & O. Press Company, The, Union Turnpike, Hudson, N. Y.
Verdin, Koppes, Verdin Co., 108 W. 2nd St., Cincinnati, Ohio
Vulcan Iron Works, 327 N. Irving Ave., Chicago
Walsh Press & Die Co., 4709 W. Kinzie St., Chicago, Ill.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.
Whitney Metal Tool Co., Rockford, Ill.
Williams, White & Co., Moline, Ill.
Zeh & Hahnemann Co., 180 Vanderpool St., Newark, N. J.

PRESSES, Punch and Turret Punch
Excelsior Tool & Machine Co., East St. Louis, Ill.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.

PRESSES, Straightening
Atlas Press Co., 1849 N. Pitcher St., Kalamazoo, Mich.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y. (Hilles & Jones Div.)
Dudgeon, Inc., Richard, 24 Columbia St., N. Y. C.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
General Manufacturing Co., 6430 Farnsworth Ave., Detroit, Mich.
Greenerd Arbor Press Co., 41 Crown St., Nashua, N. H.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Keckley, O. C., 567 Washington Blvd., Chicago
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.
Rockford Iron Works, 648 Race St., Rockford, Ill.
Springfield Machine Tool Co., The, 631 West Southern Ave., Springfield, Ohio
United Engrg. & Foundry Co., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Western Tool & Mfg. Co., Springfield, Ohio
Williams, White & Co., Moline, Ill.
Wood Company, R. D., Philadelphia, Pa.

PROFILE PROJECTORS
Leitz, Inc., E., 69 E. 10th St., New York

PROFILING MACHINES
Automatic Machine Co., Bridgeport, Conn.
Cincinnati Milling Machine Co. (Cinn.-Gardner, Inc.), Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester
Frew Machine Co., 126 West Venango St., Philadelphia, Pa.
Gorton Machine Co., Geo., 1103 13th St., Racine, Wis.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester

PROTRACTORS
Brown & Sharp Mfg. Co., Providence, R. I.
Lufkin Rule Co., The, Saginaw, Mich.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Scherr Co., Geo., 128 Lafayette St., N. Y. C.
Starrett Co., The, L. S., Crescent St., Athol, Mass.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Turner Devices, Inc., 1212A Mississippi Ave., St. Louis, Mo.

PULLEYS
Boston Gear Works, Inc., North Quincy, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.

PULLEYS (Continued)
Carlyle Johnson Machine Co., 52 Main St., Manchester, Conn.
Dayton Rubber Mfg. Co., The, Dayton, Ohio
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Dodge Mfg. Corp., Mishawaka, Ind.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Link Belt Co., 2410 W. 18th St., Chicago, Ill.
Miller & Co., Carl A., 2-4 Howard St., N. Y.
Reeves Pulley Co., Columbus, Ind.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Smith, Winfield H., Inc., Springfield, Erie County, N. Y.

PULLEYS, Magnetic
Cutler Hammer, Inc., 315 N. 12th St., Milwaukee, Wis.
Ingersoll-Rand & Co., 11 Bway, N. Y. C.
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

PUMPS, Centrifugal
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Beach-Rust Co., 40 Church St., New York
Brown & Sharpe Mfg. Co., Providence, R. I.
DeLaval Steam Turbine Co., Trenton, N. J.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Fulflo Specialties Co., Inc., Blanchester, O.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Pioneer Engrg. & Mfg. Co., 31 Melbourne Ave., Detroit, Mich.
Tomkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.

PUMPS, Hydraulic
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Broach Machine Co., 415 W. Huron St., Ann Arbor, Mich.
American Engineering Co., 2407 Aramingo Ave., Philadelphia, Pa.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Barnes Co., W. F & John, Rockford, Ill.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Buckeye Iron & Brass Works, 326 E. 3rd St., Dayton, Ohio
Burroughs Engrg. Co., Clinton & Beaver Sts., Newark, N. J.
Chambersburg Engineering Co., Chambersburg, Pa.
Clarksville Foundry & Machine Works, Commerce & Spring Sts., Clarksville, Tenn.
Davis Keyseater Co., 399 Exchange St., Rochester, N. Y.
DeLaval Steam Turbine Co., Trenton, N. J.
Dudgeon Inc., Richard, 24 Columbia St., N. Y. C.
Dunning & Boschert Press Co., Inc., 390 W. Water St., Syracuse, N. Y.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Galland-Henning Mfg. Co., Milwaukee, Wis.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Homestead Valve Mfg. Co., Corapolis, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Index Machinery Corp., 49 Central Ave., Cincinnati
Ingersoll-Rand Co., 11 Broadway, New York
Keckley, O. C., 567 Washington Blvd., Chicago
Lake Erie Engrg. Corp., Kenmore Sta., Buffalo, N. Y.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Oilgear Co., The, 1403 W. Bruce St., Milwaukee
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Robertson Co., John, 121 Water St., Brooklyn, N. Y.
Roper Corp., Geo. W., Blackhawk Park Ave., Rockford, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Sundstrand Machine Tool Co., Rockford, Ill.
E. B. Van Atta and Co., Inc., Penn Ave., Olsen, N. Y.
Vickers Incorporated, 1400 Oakman Blvd., Detroit, Mich.
[illegible]ing Pump Co., 4th & State Sts., Cedar Falls, Iowa
Watson-Stillman Co., Roselle, N. J.
West Tire Setter Co., 399 Exchange St., Rochester, N. Y.
Wood Company, R. D., Philadelphia, Pa.

PUMPS, Lubricants and Oil
Beach-Rust Co., 40 Church St., New York
Bijur Lubricating Corp., 2212 43rd Ave., Long Island City, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
DeLaval Steam Turbine Co., Trenton, N. J.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York
Pioneer Engrg. & Mfg. Co., 31 Melbourne Ave., Detroit, Mich.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Roper Corp., Geo. W., Blackhawk Park Ave., Rockford, Ill
Ruthman Machinery Co., The, Front and Pike Sts., Cincinnati, Ohio
Sundstrand Machine Tool Co., Rockford, Ill

WHERE-TO-BUY DIRECTORY

PUMPS, Lubricants and Oil (Continued)
Tomkins-Johnson Co., The 615 N. Mechanic St., Jackson, Mich.
Vickers, Incorporated, 1400 Oakman Blvd., Detroit, Mich.
Viking Pump Co., 4th & State Sts., Cedar Falls,

PUMPS, ROTARY VACUUM
Hickok Mfg. Co., W. O., Harrisburg, Pa.

PUNCH PRESS SAFETY DEVICES
Positive Safety Mfg. Co., 4408 Perkins Ave., Cleveland

PUNCHING AND SHEARING MACHINES
Beatty Mach. & Mfg. Co., Hammond, Ind.
Bliss Co., E W., Brooklyn, N. Y.
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Cincinna'i Shaper Co., Cincinnati, O.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Champion Blower and Forge Co., Harrisburg Ave. Lancaster, Pa.
Cleveland Punch & Shear Works Co., E. 40th and St Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, O.
Consolidated Machine Tool Corp., Rochester, N. Y. (Hilles & Jones Div.)
Flexo Machines, 816 W. Erie St., Chicago, Ill.
Bendley and Whittmore Co., 10 S. State St., Beloit, Wis.
Helwig Mfg. Co., St. Paul, Minn.
Kent-Owens Machine Co., Toledo, Ohio
Marshalltown Mfg. Co., Marshalltown, Iowa
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow, Wilcox Co., Southington, Conn.
Pels and Co., Henry, New York, N. Y.
Perkins Machine. Co., Warren, Mass.
Progressive Welder Co., 737 Piquette Ave., Detroit, Mich.
Rock River Machine Co., Janesville, Wis.
Rockford Iron Works, 648 Race St., Rockford, Ill.
Ryerson Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Strippit Corp., 1559 Niagara St., Buffalo, N. Y.
W. A. Whitney Mfg. Co., 636 Race St., Rockford, Ill.
Thomas Machine Mfg. Co., Pittsburgh, Pa.
Thomas Spacing Machine Co., Pittsburgh, Pa.
Whitney Metal Tool Co., Rockford, Ill.
Wickes Bros., 512 N. Water St., Saginaw, Mich.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.
Williams, White & Co., Moline, Ill.

PUNCHES, Center and Hand
American Swiss File & Tool Co., Elizabeth, N. J.
Bonney Forge & Tool Works, Allentown, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Punch & Shear Works Co., East 40th and St. Clair Ave., Cleveland, Ohio
Helwig Mfg. Co., St. Paul Minn.
Hendley and Whittemore Co., 10 S. State St., Beloit Wis.
Lufkin Rule Co., The, Saginaw, Mich.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Parker-Kalon Corp., 200 Varick St., N. Y. C.
Stanley Tools, New Britain, Conn.
Starrett Co., The L. S. Crescent St., Athol, Mass.
Whitney Metal Tool Co., Rockford, Ill.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.

PUNCHES, Power
Beatty Machine & Mfg. Co., Hammond, Ind.
Bertsch and Co., Cambridge City, Ind.
Bliss Co., E. W., Brooklyn, N. Y.
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Punch & Shear Works Co., East 40th and St. Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, O.
Consolidated Machine Tool Corp., Rochester, N. Y. (Hilles & Jones, Div.)
Henderson Machine Co., 5032 Germantown Ave., Philadelphia, Pa.
Hendley and Whittemore Co., 10 S. State St., Beloit, Wis.
New Albany Mach. Mfg. Co., New Albany, Ind.
Niagara Machine & Tool Works, 693-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn
Pels and Co., Henry, New York, N. Y.
Perkins Machine Co., Warren, Mass.
Rockford Iron Works, 648 Race St., Rockford, Ill.
Rock River Machine Co., Janesville, Wis.
Royersford Fdry. & Mach. Co. Inc., Royersford, Pa.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Strippit Corp., 1559 Niagara St., Buffalo, N. Y.
Whitney Metal Tool Co., Rockford, Ill.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.
Williams, White & Co., Moline, Ill.

PYROMETERS, Controlling
Brown Instrument Co., Phila., Pa.

PYROMETERS, Electric
Bristol Co., Waterbury, Conn.
Foxboro Company, 122 Neponset Ave., Foxboro, Mass.
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit
Illinois Testing Lab. Inc., 420 N. LaSalle St., Chicago
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Pyrometer Instrument Co., 103 Lafayette St., New York
Strong, Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio
Tagliabue Mfg. Co., C. J., Park & Nostrand Aves., Brooklyn, N. Y.
Tamms Silica Co., 228 No. LaSalle St., Chicago
Taylor Instrument Co., Rochester, N. Y.
Thwing-Albert Instrument Co., 3337 Lancaster Ave., Philadelphia, Pa.
Wheelco Instruments Co., 1112 Milwaukee Ave., Chicago, Ill.

PYROMETERS, Optical, Bi-Optical and Radiation
Bristol Co., Platts Mills, Waterbury, Conn.
Brown Instrument Co., Phila., Pa.
Pyrometer Instrument Co., 100 Lafayette St., New York

PYROMETER, Protection Tubes
Bristol Co., Platts Mills, Waterbury, Conn.
Driver-Harris Co., Harrison, N. J.
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit
Norton Company, Worcester, Mass.
Seamless Prod. Co., Inc., Milwaukee
Tagliabue Mfg. Co., C. J., Park & Nostrand Aves., Brooklyn, N. Y.
Thwing-Albert Instrument Co., 3337 Lancaster Ave., Philadelphia, Pa.
Wheelco Instruments Co., 1112 Milwaukee Ave., Chicago, Ill.

PYROMETER, Protection Wells
Bristol Co., Waterbury, Conn.
Foxboro Company, 122 Neponset Ave., Foxboro, Mass.
Taylor Instrument Co., Rochester, N. Y.
Thwing-Albert Instrument Co., 3337 Lancaster Ave., Philadelphia, Pa.

PYROMETERS, Recording
Brown Instrument Co., Phila., Pa.

QUENCHING MACHINES
Blakeslee & Co., G. S., Cicero Sta., Chicago, Ill.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

RACK CUTTING MACHINES
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

RACKS, Barrel and Drum
Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill.

RACKS, Gear, Cut
Adams Co., East Fourth St., Dubuque, Ia.
Boston Gear Works Inc., North Quincy, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Gear Co., 1825 Reading Rd., Cincinnati, O.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, O.
Colonial Broach Co., Detroit, Mich.
Chas. E. Crofoot Gear Corp., South Easton, Mass.
Detroit Tap & Tool Co., Detroit, Mich.
Earle Gear & Machine Co., 4723 Stenton Ave., Phila., Pa.
Fellows Gear Shaper Co., Springfield, Vt.
Foote Bros. Gear & Mach. Corp., 5301 S. Western Blvd., Chicago, Ill.
Foote Gear Works Inc., 1301 South Cicero Ave., Cicero, Ill.
Ganschow Gear Co., 1007 W. Washington Blvd., Chicago, Ill.
Gear Specialties Inc., 2635 Canton St., Chicago, Ill.
Grant Gear Works, Inc., 154 W. Second St., South Boston, Mass.
Hartford Special Machinery Co., 282 Homestead Ave., Hartford, Conn.
Horsburgh & Scott Co., 5114 Hamilton Ave., Cleveland, Ohio
Link Belt Co., 2410 W. 18th St., Chicago, Ill.
Massachusetts Gear & Tool Co., 25 Nashua St., Woburn, Mass.
Mechanical Specialties, Inc., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Michigan Tool Co., Detroit, Mich.
Philadelphia Gear Works, Phila. Pa.
Vinco Tool Co., 7350 Central Ave., Detroit

RASPS (see Files and Rasps)

RATCHETS (see Gears, Cut)

REAMERS, Adjustable
Apex Mach. & Tool Co., Dayton, O.
Barber-Colman Co., 1200 River St., Rockford, Ill.
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Clough, R. M., Meridan, Conn.
Colonial Broach Co., Detroit, Mich.

REAMERS, Adjustable (Continued)
Davis Boring Tool Co. (Div. Larkin Packer Co., 6200 Maple Ave., St. Louis, Mo.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Gammons Holman Co., 405 Main St., Manchester, Conn.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Ingersoll Milling Machine Co., Rockford, Ill.
Kelly Reamer Co., 3775 Ridge Road, Cleveland, O.
McCrosky Tool Corp., 1340-80 S. Main St., Meadville, Pa.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Tool Co., Cleveland, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Standard Tool Co., The, 6918 Central Ave., Cleveland, O.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Tungsten Carbide Tool Co., Detroit
Union Twist Drill Co., Athol, Mass.
Wetmore Reamer Co., 418 N. 27th St., Milwaukee, Wis.

REAMERS, Cemented Carbide Tipped
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Firth Sterling Steel Co., McKeesport, Pa.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Kelly Reamer Co., 3775 Ridge Road, Cleveland, Ohio
McCrosky Tool Corp., Meadville, Pa.
Michigan Tool Co., Detroit
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Tungsten Carbide Tool Co., Detroit

REAMERS, Pipe
American Swiss File & Tool Co., Elizabeth, N. J.
Armstrong-Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools Inc., 1937 Amma Ave., Warren, Ohio
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Card Mfg. Co., S. W., (Div. Union Twist Drill) Mansfield, Mass.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Oster Mfg. Co., The, 2037 E. 61st Pl., Cleveland, O.
Standard Tool Co., The, 6918 Central Ave., Cleveland, O.
Torrington Co., The, Field St., Torrington, Conn.

REAMERS, Shell
Morse Twist Drill & Machine Co., New Bedford, Mass.

REAMERS, Solid
Apex Mach. & Tool Co., Dayton, O.
Barber-Colman Co., 1200 River St., Rockford, Ill.
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Colonial Broach Co., Detroit, Mich.
Davis Boring Tool Co. (Div. Larkin Packer Co.), 6200 Maple Ave., St. Louis, Mo.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Gammons Holman Company, 405 Main St., Manchester, Conn.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Haynes Stellite Co., Kokomo, Ind.
Holman Reamer Co., 29 Summit St., Manchester, Conn.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.

WHERE-TO-BUY DIRECTORY

REAMERS, SOLID (Continued)
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Standard Tool Co., The, 6918 Central Ave., Cleveland, O.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.
Weldon Tool Co., 3000 Woodhill Rd., Cleveland

REAMERS, Taper Pin Hole
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Colonial Broach Co., Detroit, Mich.
Davis Boring Tool Co. (Div. Larkin Packer Co.),; 6200 Maple Ave., St. Louis, Mo.
Detroit Tap & Tool Co., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Gammons Holman Co., 405 Main St., Manchester, Conn.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Holman Reamer Co., Manchester, Conn.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

REAMING MACHINES, Portable Electric, and Pneumatic
Black & Decker Mfg. Co., Towson, Md.
Buckeye Portable Tool Co., 29 W. Apple St., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 E. 44th St., N. Y. C.
Hisey-Wolf Machine Co., Cincinnati, O.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, O.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

RECEIVERS, Air and Gas
Chicago Pneumatic Tool Co., 6 E. 44th St., N. Y. C.
Curtis Pneumatic Mach. Co., 1924 Kienlen Ave., St. Louis, Mo.
DeVilbiss Company, 300 Phillips Ave., Toledo
Ingersoll-Rand Co., 11 Broadway, New York
Sullivan Machinery Co., Michigan City, Ind.

RECLAIMING ROLLS
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.

RECORDERS, Pressure
Bristol Co., Waterbury, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4934 Stenton Ave., Phila., Pa.
Marsh Corp., Jas. P., 2073 Southport Ave., Chicago
Tagliabue Mfg. Co., C. J.., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford
Taylor Instrument Co., Rochester, N. Y.

RECORDERS, Speed
Bristol Company, Waterbury, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4934 Stenton Ave., Phila., Pa.
Veeder-Root Incorporated, Hartford, Conn.

RECORDERS, Temperature
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Phila., Pa.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit, Mich.
Leeds & Northrup Co., 4934 Stenton Ave., Phila., Pa.
Marsh Corp., Jas. P., 2073 Southport Ave., Chicago
Partlow Corp., 2 Campion Road, New Hartford, N. Y.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford
Taylor Instrument Co., Rochester, N. Y.
Thwing-Albert Instrument Co., 3337 Lancaster Ave., Phila, Pa.

RECORDERS, Time
Bristol Co., Waterbury, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.

RECTIFIERS, Mercury Arc
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Continental Electric Co., Geneva, Ill.

RECTIFIERS, Mercury Arc (Continued)
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

RECTIFIERS, Power
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Pier Equipment Mfg. Co., Milton & Cross Sts., Benton Harbor, Mich.
Raytheon Mfg. Co., 190 Willow St., Waltham, Mass.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

REDUCERS, Speed (see Speed Reducers)

REELS, Strip Stock
Littell Machine Co., F. J., 4127 Ravenswood Ave., Chicago, Ill.

REFLECTORS, Lighting
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

REFRACTORIES
Bay State Abrasive Products Co., Westboro, Mass.
Botfield Refractories Co., Swanson & Clymer Sts., Philadelphia, Pa.
Carborundum Co., Niagara Falls, N. Y.
Johns-Manville, 22 E. 40th St., N. Y. C.
Norton Co., Worcester, Mass.
Quigley Co., Inc., 56 W. 45th St., New York City
Strong, Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio

REFRIGERATING MACHINES
Phoenix Ice Mach. Co., 2703 Church Ave., Cleveland

REGULATORS, Electric Current
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Raytheon Mfg. Co., 190 Willow St., Waltham, Mass.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

REGULATORS, Oxygen and Acetylene
Air Reduction Sales Co., 60 E. 42nd St., N. Y. C.
Linde Air Products Co., 30 E. 42nd St., N. Y. C.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

REGULATORS, Speed
Cutler Hammer, Inc., 315 N. 12th St., Milwaukee, Wis.
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Link-Belt Co., 2405 W. Hunting Post Ave., Philadelphia
Vickers, Inc., 1410 Oakman Blvd., Detroit

REGULATORS, Temperature
American Gas Furnace Co., Elizabeth, N. J.
Automatic Temperature Control Co., 34 E. Logan St., Pittsburgh, Pa.
Barber-Colman Co., Rockford, Ill.
Bristol Company, Waterbury, Conn.
Brown Instrument Co. (A Div. of Minneapolis-Honeywell Reg. Co.) 4501 Wayne Ave., Philadelphia, Pa.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Keckley, O. C., 567 Washington Blvd., Chicago
Leeds & Northrup Co., 4934 Stenton Ave., Phila.
Partlow Corp., 2 Campion Road, New Hartford, N. Y.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor Instrument Co., Rochester, N. Y.

REINFORCEMENT FABRIC, Concrete
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Wickwire Spencer Steel Co., N. Y. C.

RELAYS
Guardian Elec. Mfg. Co., 1621-27 W. Walnut St., Chicago

REMOVERS, Japan, Lacquer, Enamel, etc.
Oakite Products Co., 22 Thames St., N. Y. C.

RESPIRATORS
American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 Warren Blvd., Chicago
DeVilbiss Company, 300 Phillips Ave., Toledo, O.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Mine Safety Appliance Co., Braddock St., Pittsburgh
Pangborn Corporation, Hagerstown, Md.
Willson Products, Inc., Reading, Pa.

RHEOSTATS
Allen-Bradley Co., 1326 South Second St., Milwaukee, Wis.
Cutler Hammer Inc., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 East 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Monitor Controller Co., Gay, Lombard and Frederick Sts., Baltimore, Md.
Square D. Electric Co., 710 S. 3rd St., Milwaukee, Wis.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

RIVET BOLTS
Dardelet Threadlock Corp., 120 B'way, N. Y.

RIVET CUTTING APPARATUS, Oxy-Acetylene
Air Redution Sales Co., 60 E. 42nd St., N. Y. C.
Linde Air Products Co., Inc., 30 E. 42nd St., N. Y. C.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

RIVET HEADING MACHINES
Acme Machinery Co., 4533 St. Clair Ave., Cleveland, O.
Ajax Mfg. Co., Euclid Branch, P. O. Cleveland, O.
Grant Mfg. & Machine Co., 90 Silliman Ave., Bridgeport, Conn.
High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y.
National Machinery Co., Greenfield St., Tiffin, Ohio
Rock River Machine Co., Janesville, Wis.
Tompkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

RIVET HEATERS
American Car & Fdry. Co., 30 Church St., N. Y.
American Gas Furnace Co., Elizabeth, N. J.

RIVETERS, Hydraulic
Baldwin-Southwark Corp., Paschall P. O. Station, Phila., Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Lake Erie Engrg. Corp., Kenmore Sta., Buffalo, N. Y.
Watson-Stillman Co., Roselle, N. J.

RIVETING HAMMERS
Chicago Pneumatic Tool Co., 6 East 44th St., N. Y. C.
High Speed Hammer Co., Inc., 119 Norton St., Rochester, N. Y.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Williams, White & Co., Moline, Ill.

RIVETING MACHINES
Buffalo Forge Co., 448 Broadway, Buffalo
Chicago Pneumatic Tool Co., 6 East 44th St., N. Y. C.
Grant Mfg. & Machine Co., 90 Silliman Ave., Bridgeport, Conn.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
High Speed Hammer Co., Inc., 119 Norton St., Rochester, N. Y.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Linley Bros. Co., 9 Montauk St., Bridgeport
Norin Engrg. Co., 359 Union Park Court, Chicago
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Rock River Machine Co., Janesville, Wis.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Tubular Rivet & Steel Co., Boston, Mass.
Whitney Metal Tool Co., Rockford, Ill.
Williams, White & Co., Moline, Ill.

RIVETS
American Steel & Wire Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dardelet Threadlock Corp., 120 Bdwy., N. Y.
Tubular Rivet & Steel Co., Boston, Mass.

RIVETS, Aluminum
Alumnum Co. of America, 2107 Gulf Bldg., Pittsburgh, Pa.

RIVETS, Copper, Brass and Bronze
Conklin Brass & Copper Co., Inc., T. E., 54 Lafayette St., New York City

RIVET SETS
American Swiss File & Tool Co., Elizabeth, N. J.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Cleveland Punch & Shear Works Co., East 40th and St. Clair Ave., Cleveland, O.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Kane & Roach, Syracuse, N. Y.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.

ROD, Welding Hard Facing
American Manganese Steel Div., 389 E. 14th St., Chicago Heights, Ill.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Haynes-Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Linde Air Products Co., Inc., New York City
Ludlum Steel Co., Watervliet, N. Y.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

RODS, Wire
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Wickwire, Spencer Steel Co., N. Y. C.

ROLLERS, Bearing
Bantam Ball Bearing Co., South Bend, Ind.
Torrington Co., The, Field St., Torrington, Conn.

WHERE-TO-BUY DIRECTORY

ROLLS, Bending
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Buffalo Forge Co., 448 Broadway, Buffalo
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Cleveland Punch & Shear Works Co., East 40th and St. Clair Ave., Cleveland, Ohio
Consolidated Machine Tool Corp., Rochester
Continental Tool & Steel Fdry. Co., E. Chicago, Ill.
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Hendley and Whittemore Co., 10 S. State St., Beloit, Wis.
Kane & Roach, Syracuse, N. Y.
Marshalltown Mfg. Co., 900 E. Nevada St., Marshalltown, Iowa
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox, Southington, Conn.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
United Engrg. & Fdy. Co., Pittsburgh, Pa.
Wicks Bros., 512 No. Water St., Saginaw, Mich.
Williams, White & Co., Moline, Ill.

ROLLS, Hardened Tool Steel
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Prosser & Sons, Thomas, 120 Wall St., N. Y. C.

ROLLS, Magnetic
Magnetic Mfg. Co., Milwaukee, Wis.

ROTARY FILES
Disston & Sons, Inc., Henry, Tacony, Phila., Pa.
Ford Mfg. Co., M. A., Davenport, Iowa
Grobet File Corp. of America, 3 Park Place, New York
Hamilton Tool Co., Hamilton, O.
Jarvis Co., Charles L., Middletown, Conn.
Mall Tool Co. 7740 S. Chicago Ave., Chicago
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Strand Co., N. A., 5001 No. Lincoln St., Chicago, Ill.

ROTARY PLANERS
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland, O.
General Machinery Corp., (Niles Tool Wks. Div.), 545 North Third St., Hamilton, O.

ROUTING MACHINES
Consolidated Mach. Tool Corp., Rochester (Hilles & Jones Div.)
Gorton Machine Co., Geo., 1103 13th St., Racine, Wis.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.

RUBBER, Liquid & Plastic
Self-Vulcanizing Rubber Co., 605 W. Washington Blvd., Chicago, Ill.

RUBBING MACHINES (Varnish, etc.)
Mattison Machine Works, Blackhawk Park Ave. and C.B.&Q. Tracks, Rockford, Ill.
Sundstrand Machine Co., Rockford, Ill.

RULES, Aluminum, Brass, Steel and Wood
Brown & Sharpe Mfg. Co., Provience, R. I.
Lufkin Rule Co., The, Saginaw, Mich.
Stanley Tools, New Britain, Conn.
Starrett Co., The, L. S., Crescent St., Athol, Mass.

RUST PREVENTIVES
American Coppercote, Inc., 480 Lexington Ave., New York
Bakelite Corp., Bound Brook, N. J.
Collard, Inc., Detroit, Mich.
Houghton & Co., E. F., Phila., Pa.
Never Rust Mfg. Co., 1771 E. 18th St., Brooklyn, N. Y.
Oakite Products Co., 22 Thames St., N. Y. C.
Quigley Co. Inc., 56 W. 45th St., N. Y. C.
Socony-Vacuum Oil Co., N. Y. C.
Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.

RUST PROOFING COMPOUNDS
American Coppercote, Inc., 480 Lexington Ave., N. Y. C.
Bakelite Corp., Bound Brook, N. J.
Goodrich Company, B. F., Akron, Ohio
Holden Co., A. F., 200 Winchester Ave., New Haven, Conn.
Houghton & Co., E. F., Phila., Pa.
Never Rust Mfg. Co., 1771 E. 18th St., Brooklyn, N. Y.
Oakite Products Co., 22 Thames St., N. Y. C.
Parker Rust-Proof Co., 2177 E. Milwaukee Ave., Detroit
Quigley Co. Inc., 56 W. 45th St., New York City
Socony-Vacuum Oil Co., Inc., N. Y. C.

SAFETY CANS
Justrite Mfg. Co., Chicago, Ill.

SAFETY GUARDS FOR PUNCH PRESSES
Humm Tool & Mach. Co., John, 257 Sheffield Ave., Bklyn., N. Y.
Walsh Press & Die Co., 4709 W. Kinzie St., Chicago, Ill.

SALT BATHS, Heat Treating
Bellis Heat Treating Co., Branford, Conn.

SAND BLAST EQUIPMENT
American Foundry Equipment Co., Mishawaka, Ind.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Pangborn Corporation, Hagerstown, Md.

SAND CUTTERS
American Foundry Equipment Co., Mishawaka, Ind.

SANDERS
American Saw Mill Machinery Co., Hackettstown, N. J.
Armglo Co., Milwaukee, Wis.
Boice Crane Co., Toledo, Ohio
Buckeye Portable Tool Co., 29 West Apple St., Dayton, Ohio
Carborundum Co., Niagara Falls, New York
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Mall Tool Co., 7740 S. Chicago Ave., Chicago
Porter-Cable Machine Co., 1714 N. Salina St., Rochester, N. Y.
Production Machine Co., Greenfield, Mass.
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, O.
Strand Co., N. A., 5001 N. Lincoln St., Chicago
Walker-Turner Co., Inc., 639 South Ave., Plainfield, N. J.
Walls Sales Corp., 96 Warren St., New York

SANDERS, Portable Electric and Pneumatic
Black & Decker Mfg. Co., Towson, Md.
Buckeye Portable Tool Co., 29 West Apple St., Dayton, Ohio
Carborundum Co., Niagara Falls, New York
Chicago Pneumatic Tool Co., 6 East 44th St., N. Y. C.
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Jarvis Co., Charles L., Gildersleeve, Conn.
Mall Tool Co., 7740 S. Chicago Ave., Chicago
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond, 436 Capitol Ave., Hartford, Conn.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill.
Stanley Elec. Tool Div. The, Stanley Works, New Britain, Conn.
Stow Mfg. Co., Inc., 443 State St., Binghamton, N. Y.
Swartz & White Mfg. Co., 215 Washington St., Binghamton, N. Y.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, O.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.
Walker-Turner Co., Inc., 639 South Ave., Plainfield, N. J.

SAW BLADES, Band
Huther Bros. Saw & Mfg. Co., Rochester, N. Y.

SAW SHARPENERS AND GUMMERS
Cochrane-Bly Co., Rochester, N. Y.
Covel Mfg. Co. Benton Harbor, Mich.
Heller Machine Co., 114 Liberty St., N. Y. C.

SAWING MACHINES, Band
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Avery Drilling Machine Co., Cincinnati, O.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Cochrane-Bly Co., 15 St. James St., Rochester
Continental Machine Specialties, Inc., 1301 Washington Ave. S., Minneapolis, Minn.
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Grob Brothers, West Allis, Wis.
Index Machinery Corp., 49 Central Ave., Cincinnati, O.
Marburg Brothers, Inc., 90 West St., N. Y. C.
Oliver Machinery Co., Grand Rapids, Mich.
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Ryerson & Son, Inc., Joseph T., 2558 W. 16th St., Chicago, Ill.
Walker-Turner Co., Inc., 639 South Ave., Plainfield, N. J.
Wells Manufacturing Corp., 315 Seventh Ave., Three Rivers, Mich.

SAWING MACHINES, Flexible Shaft
Stow Mfg. Co., Inc., 443 State St., Binghamton, N. Y.

SAWING MACHINES, Hot
Acme Machinery Co., 4533 St. Clair Ave., Cleveland, O.
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, O.
Mall Tool Co., 7740 S. Chicago Ave., Chicago, Ill.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

SAWING MACHINES, Power Hack
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Heller Machine Co., 114 Liberty St., N. Y. C.
Marburg Brothers, Inc., 90 West St., N. Y. C.
Oster Mfg. Co., The, 2057 East 61st Place, Cleveland, O.
Peerless Machine Co., 1615 Racine St., Racine, Wis.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.

SAWING MACHINES, Power Hack (Continued)
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Ryerson & Son, Joseph T., Inc., 2558 W. 16th St., Chicago, Ill.
Wells Manufacturing Corp., 315 Seventh Ave., Three Rivers, Mich.

SAWS, Band
American Saw Mill Machinery Co., Hackettstown, N. J.
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Avery Drilling Machine Co., Inc., Cincinnati, O.
Barnes Co., Inc., W. O., 1297 Terminal Ave., Detroit, Mich.
Black Diamond Saw & Mach. Wks., 43 North Ave., Natick, Mass.
Boice Crane Co., Toledo, O.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Clemson Bros. Inc., 22 Cottage St., Middletown, N. Y.
Continental Machine Specialties, Inc., 1301 Washington Ave. S., Minneapolis, Minn.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Disston & Sons, Inc., Henry, Tacony, Phila., Pa.
Forsberg Mfg. Co., Bridgeport, Conn.
Grobet File Corp. of America, 3 Park Place, N. Y. C.
Wm. Laidlaw Inc., 7 Greenwich St., Belmont, N. Y.
Marburg Bros., Inc., 90 West St., N. Y. C.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Napier Saw Works, Inc., Middletown, N. Y.
Oliver Machinery Co., Grand Rapids, Mich.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Victor Saw Works, Inc., 22 Cottage St., Middletown, N. Y.
Walls Sales Corp., 96 Warren St., New York
Wells Manufacturing Corp., 315 Seventh Ave., Three Rivers, Mich.

SAWS, Circular, Metal Cutting
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Barber-Colman Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Consolidated Mach. Tool Corp. Rochester (Newton Div.)
DeWalt Products Co., Lancaster, Pa.
Disston & Sons, Inc., Henry, Tacony, Phila., Pa.
Earle Gear & Machine Co., 4723 Stenton Ave., Phila., Pa.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Heller Machine Co., 114 Liberty St., N. Y. C.
Huther Bros. Saw & Mfg. Co., Rochester, N. Y.
Ideal Commutator Dresser Co., Sycamore, Ill.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Standard Tool Co., The, 6918 Central Ave., Cleveland, O.
Tabo Mfg. Co., 6225 Tacony St., Philadelphia
Tungsten Carbide Tool Co., Detroit
Union Twist Drill Co., Athol, Mass.

SAWS, Circular, Wood Cutting
American Saw Mill Machinery Co., Hackettstown, N. J.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Boice Crane Co., Toledo, Ohio
Curtis Pneumatic Machinery Co., 1924 Kemlen Ave., St. Louis, Mo.
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Greenlee Bros. & Co., Twelfth Street and Columbia Ave., Rockford, Ill.
Mattison Machine Works, Blackhawk Park Ave. and C. B. & Q. Tracks, Rockford, Ill.
Michigan Tool Co., Detroit, Mich.
Oliver Machinery Co., Grand Rapids, Mich.
Walker-Turner Co. Inc., 639 South Ave., Plainfield, N. J.

SAWS, Hack, Frames and Blades
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Barnes Co., Inc., W. O., 1297 Terminal Ave., Detroit, Mich.
Clemson Bros., Inc., Middletown, N. Y.
Disston & Sons, Inc., Henry, Tacony, Phila., Pa.
Forsberg Mfg. Co., Bridgeport, Conn.
Marburg Brothers, Inc., 90 West St., N. Y. C.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Napier Saw Works, Inc., Middletown, N. Y.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.

WHERE-TO-BUY DIRECTORY

SAWS, Hack, Frames and Blades (Continued)
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Starrett Co., The, L. S., Crescent St., Athol, Mass.
Victor Saw Works, Inc., Middletown, N. Y.

SAWS, Hole
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Black & Decker Mfg. Co., Towson, Md.
D. & D. Tool Co., 2518 Western Ave., Seattle, Wash.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
R & L Tool Co., Philadelphia, Pa.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

SAWS, Milling
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston & Sons, Inc., Henry, Tacony, Phila., Pa.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Stuart & Co., D. A., 2727 So. Troy St., Chicago, Ill.
Tungsten Carbide Tool Co., Detroit
Union Twist Drill Co., Butterfield Division, Derby Line, Vt.
Wesson Co., Detroit, Mich.

SAWS, Portable Electric & Pneumatic
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Black & Decker Mfg. Co., Towson, Md.
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Skilsaw Inc., 3310 Elston Ave., Chicago, Ill.
Speedway Mfg. Co., 1834 So. 52nd Ave., Cicero, Ill.
Stanley Elec. Tool Div. The Stanley Works, New Britain, Conn.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, O.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.
Wells Manufacturing Corp., 315 Seventh Ave., Three Rivers, Mich.

SAWS, Screw Slotting
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Barber Colman Mfg. Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston & Sons, Inc., Henry, Tacony, Phila., Pa.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
National Tool Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

SCALES
Brown & Sharpe Mfg. Co., Providence, R. I.
Exact Weight Scale Co., Columbus, O.
Fairbanks Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Lufkin Rule Co., Saginaw, Mich.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Starrett Co., The L. S., Crescent St., Athol, Mass.

SCALES, Drafting
Universal Drafting Machine Co., 1426 West Third St., Cleveland, O.

SCALING HAMMERS, Pneumatic
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Chicago Pneumatic Tool Co., 6 East 44th St., N. Y. C.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.

SCRAPING MACHINES
Anderson Bros. Mfg. Co., Rockford, Ill.

SCREENS, Woven Wire
Ludlow-Saylor Wire Co., St. Louis, Mo.
Wickwire Spencer Steel Co., N. Y. C.

SCREW DRIVERS, Automatic
Akron Automatic Machine Co., 1976 E. 66th St., Cleveland, O.
Bodine Corp., 1720 Fairfield Ave., Bridgeport, Conn.
Detroit Power Screwdriver Co., 5365 Rohns Ave., Detroit, Mich.
Garlander, Henry, 525 W. 148th St., N. Y. C.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.

SCREW DRIVERS, Flexible Shaft
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Charles L. Jarvis Co., Middletown, Conn.
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.
Strand Co., N. A., 5001 No. Lincoln St., Chicago, Ill.

SCREW DRIVERS for Portable Tools
Apex Machine and Tool Co., Dayton, O.
Millers Falls Co., 57 Wells St., Greenfield, Mass.

SCREW DRIVERS, Hand
American Swiss File & Tool Co., Elizabeth, N. J.
Bonney Forge and Tool Works, Allentown, Pa.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Peck, Stow & Wilcox Co., Center St., Southington, Conn.

SCREW DRIVERS, Portable Electric & Pneumatic
Black & Decker Mfg. Co., Towson, Md.
Buckeye Portable-Tool Co., 29 West Apple St., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 East 44th St., N. Y. C.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Jarvis Co., Chas. L., Middletown, Conn.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Speedway Mfg. Co., 1834 So. 52nd Ave., Cicero, Ill.
Stanley Elec. Tool Div. The Stanley Works, New Britain, Conn.
U. S. Electrical Tool Co., 2489 W Sixth St., Cincinnati, O.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

SCREW EXTRACTORS
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Standard Tool Co., The, 6918 Central Ave., Cleveland, O.

SCREW MACHINE TOOLS & ATTACHMENTS
Brown & Sharpe Mfg. Co., Providence, R. I.
Meisel Press Mfg. Co., 944 Dorchester Ave., Boston, Mass.

SCREW-MACHINE WORK (See also Contract Work)
Brown & Sharpe Mfg. Co., Providence, R. I.
Eastern Machine Screw Corp., Truman & Barclay Sts., New Haven, Conn.
Lempco Products Inc., Dunham Road, Bedford, O.
Link-Belt Co., 519 N. Holm Ave., Indianapolis
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Acme Co., Cleveland, O.
New Britain Gridley Mach Div., The New Britain Mach Co., New Britain, Conn.
Poorman, J. E., 1825 Bristol St., Phila.
Standard Pressed Steel Co., Jenkintown, Pa.
Wicaco Machine Corp., Stenton Ave., Phila., Pa.

SCREW MACHINES, Automatic
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Automatic Machine Co., Cleveland, O.
Cone Automatic Machine Co., Windsor, Vt.
Davenport Machine Tool Co., 167 Ames St., Rochester, N. Y.
Foster Machine Co., Elkhart, Ind.
Greenlee Bros & Co., Twelfth Street and Columbia Ave., Rockford, Ill.
Hardinge Brothers, Inc., Elmira, N. Y.
Modern Collette & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
National Acme Co., Cleveland, O.
New Britain-Gridley Machine Div. New Britain Machine Co., 140 Chestnut St., New Britain, Conn.
Windsor Automatic Co. Inc., Depot Ave., Windsor, Vt.

SCREW MACHINES, Plain and Hand
Acme Machine Tool Co., 4955 Spring Grove Ave., Cincinnati, O.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Automatic Machine Co., Cleveland, O.
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Modern Collet & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
National Acme Co., Cleveland, O.
Rivett Lathe & Grinder Inc., Brighton, Boston, Mass.
Stark Tool Co., Waltham, Mass.
Warner & Swassey Co., 5701 Carnegie Ave., Cleveland, O.

SCREW MACHINES, Plain and Hand, Bench Type
Ames Co., B. C. Waltham, Mass.
Hardinge Brothers, Inc., Elmira, N. Y.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Stark Tool Company, Waltham, Mass.

SCREW PLATES
Butterfield Div. (Union Twist Drill Co.) Derby Line, Vt.
S. W. Card Mfg. Co. (Div. Union Twist Drill), Mansfield, Mass.
Champion Blower & Forge Co., Lancaster, Pa.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Union Twist Drill Co., Athol, Mass.
Winter Bros. Co., Wrentham, Mass.

SCREW PRESSES
Dunning & Boschart Press Co., Inc., 390 W. Water St., Syracuse, N. Y.
Francis Co., Chas. E., W. Fifth St., Rushville, Ind.
Perkins Machine Co., Warren, Mass.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

SCREW SLOTTING
Stark Tool Co., Waltham, Mass.
Union Twist Drill Co., Athol, Mass.

SCREW THREAD, Locking
Dardelet Threadlock Corp., 120 Broadway, N. Y. C.

SCREWS, Cap and Set
Allen Mfg. Co., Hartford, Conn.
Baumbach Mfg. Co., E. A., Chicago, Ill.
Bristol Company, Waterbury, Conn.
Danly Machine Specalties Inc., Chicago, Ill.
Dardelet Threadlock Corp., 120 Bdway., N. Y.
Holo-Krome Screw Corp., The, Hartford, Conn.
National Acme Co., Cleveland, O.
Parker-Kalon Corp., 200 Varick St., N. Y. C.
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., 1932 West Third St., Cleveland, O.

SCREWS, Machine
Allen Mfg. Co., Hartford, Conn.
Bristol Company, Waterbury, Conn.
Dardelet Threadlock Corp., 120 Bdway., N. Y.
Holo-Krome Screw Corp., Hartford, Conn.

SCREWS, Safety
Dardelet Threadlock Corp., 120 Bdway., N. Y.
Holo-Krome Screw Corp., The, Hartford, Conn.
Parker-Kalon Corp., 200 Varick St., N. Y. C.
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio

SCREWS, Self Tapping
Parker-Kalon Corp., 200 Varick St., N. Y. C.

SCREWS, Thumb & Wing
Parker-Kalon Corp., 200 Varick St., N. Y. C.

SCRIBERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.
Lufkin Rule Co., Saginaw, Mich.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Starrett Co., The L. S., Crescent St., Athol, Mass.

SEALING COMPOUND
Fostoria Pressed Steel Co., Fostoria, O.
Quigley Co., Inc., 56 W. 45th St., N. Y. C.

SELF-OPENING DIE HEADS (see Die Heads)

SEPARATORS, Centrifugal
DeLaval Steam Turbine Co., Trenton, N. J.
National Acme Co., Cleveland, Ohio
Tolhurst Div. of American Machine & Metals Mfg. Corp., Troy, N. Y.

SEPARATORS, Magnetic
Cutler Hammer Inc., Milwaukee, Wis.
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

SEPARATORS, Oil and Waste
DeLaval Separator Co., 165 Broadway, N. Y. C.

SHAFTING
American Brass Co., Waterbury, Conn.
Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y.
Dodge Mfg. Corp., 505 S. Union St., Mishawaka, Ind.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
International Nickel Co. Inc., 67 Wall St., New York, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Link Belt Co., 2410 W. 18th St., Chicago, Ill.
Monarch Steel Co., Indianapolis, Ind.
Power Transmission Council, 1 Atlantic St., Stamford, Conn.
Revere Copper & Brass Corp., 230 Park Ave., N. Y. C.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Union Drawn Steel Co., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHAFTS, Flexible
Earle Gear & Mach. Co., 4707 Stenton Ave., Phila, Pa.
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.

WHERE-TO-BUY DIRECTORY

SHAFTS, Flexible (Continued)
Jarvis Co., Chas. L., Middletown, Conn.
Mall Tool Co., 7740 S. Chicago Ave., Chicago
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Smith Co., T. L., Milwaukee, Wis.
Stow Mfg. Co. Inc., 443 State St., Binghamton, N. Y.
Strand Co., N. A., 5001 No. Lincoln St., Chicago, Ill.
Swartz & White Mfg. Co., 215 Washington St., Binghamton, N. Y.
White Dental Mfg. Co., S. S., 10 E. 40th St., N. Y. C.

SHAPER DRIVES
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Dayton Rubber Mfg. Co., Dayton, Ohio
Hendley Machine Co., 105 Summer St., Torrington, Conn.

SHAPER-MILLER, Vertical
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.

SHAPER TOOLS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Ready Tool Co., Irvington and Railroad Aves., Bridgeport, Conn.

SHAPERS
American Tool Works Co., Pearl & Eggleston Aves., Cincinnati, Ohio
Ames Co., B. C., Waltham, Mass.
Atkinson & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Cincinnati Shaper Co., Cincinnati, O.
Columbia Machine Tool Company, 1798 Fairgrove Ave., Hamilton, O.
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Index Machinery Corp., 49 Central Ave., Cincinnati, O.
Morton Mfg. Co., Muskegon Heights, Mich.
Ohio Machine Tool Co., Kenton, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Rockford Machine Tool Co., Rockford, Ill.
Schuyler, V. A., 250 W. 57th St., New York
Smith & Mills Co., Cincinnati, Ohio
Steege Machinery Co., Chicago, Ill.

SHAPERS, Draw-Cut
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Morton Mfg. Co., Muskegon Heights, Mich.

SHAPERS, Vertical
Ames Co., B. C., Waltham, Mass.
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Columbia Machine Tool Co., 1798 Fairgrove Ave., Hamilton, O.
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Marburg Bros., Inc., 90 West St., N. Y. C.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.

SHAPES, Cold Drawn
Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y.
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Union Drawn Steel Co., Massillon, O.
Universal Steel Co., Bridgeville, Pa.
Wyckoff Drawn Steel Co., Box 1256, First National Bank Bldg., Pittsburgh, Pa.

SHAPES, Structural Steel
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa., and Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

SHARPENING MACHINES, Cutter
Barber Colman Co., Rockford Ill.
Cincinnati Milling Machine Co., Cincinnati, O.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Oliver Instrument Co., Adrian, Mich.

SHARPENING MACHINES, Saw
Atkins, E. C. and Co., 402 S. Illinois St., Indianapolis, Ind.
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Hanchett Mfg. Co., 906 North State St., Big Rapids, Mich.
Heller Machine Co., 114 Liberty St., N. Y. C.

SHARPENING STONES
Abrasive Company, Tacony & Fraley Sts., Phila.
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

SHAVING TOOLS
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cello-O Aircrafft and Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Fellows Gear Shaper Co., Springfield, Vt.

SHAVING TOOLS (Continued)
Gorhan Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Michigan Tool Co., Detroit, Mich.

SHEAR KNIVES
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, O.
Colonial Broach Co., Detroit, Mich.
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, O.
Detroit Tap & Tool Co., Detroit, Mich.
Disston & Sons, Henry, Inc., Tacony St., Phila., Pa.
Haynes Stellite Co., Kokomo, Indiana
Handley and Whittemore Co., 10 S. State., Beloit, Wis.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Michigan Tool Co., Detroit, Mich.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.
Rock River Machine Co., Janesville, Wis.

SHEARS, Hand
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Canton Fdry. & Mach. Co., 6400 Breakwater Ave., Cleveland, O.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Helwig Mfg. Co., St. Paul, Minn.
Hendley and Whittemore Co., 10 S. State St., Beloitt, Wis.
Marburg Brothers, Inc., 90 West St., N. Y. C.
Marshalltown Mfg. Co., 900 E. Nevada St., Marshalltown, Iowa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Mass.
Rock River Machine Co., Janesville, Wis.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Wallace Supplies Mfg. Co., 1310 Diversey Pkway., Chicago
Whitney Metal Tool Co., Rockford, Ill.
Wiss & Sons Co., J., 33 Littleton Ave., Newark, N. J.

SHEARS, Power
Beatty Machine & Mfg. Co., Hammond, Ind.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Black & Decker Mfg. Co., Towson, Md.
Bliss Co., E. W., Brooklyn, N. Y.
Buffalo Forge Co., 448 Broadway, Buffalo
Champion Blower & Forge Co., Lancaster, Pa.
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, Ohio
Consolidated Machine Tool Corp., Rochester
Excelsior Tool & Machine Co., East St. Louis, Ill.
Helwig Mfg. Co., St. Paul, Minn.
Hendley and Whittemore Co., 10 S. State St., Beloit, Wis.
Libert Machine Co., 324 N. Roosevelt St., Green Bay, Wis.
Marburg Bros, Inc., 90 West St., N. Y. C.
Marshalltown Mfg. Co., 900 E. Nevada St., Marshalltown, Iowa
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engrg. Co., Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.
Rock River Machine Co., Janesville, Wis.
Royersford Fdry. & Mach. Co., Inc., Royersford, Pa.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Pels and Co., Henry, New York, N. Y.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.
Steege Machy. Co., Chicago, Ill.
United Engrg. & Fdry Co., Pittsburgh, Pa.
Wickes Bros., 512 No. Water St., Saginaw, Mich.
Williams, White & Co., Moline, Ill.

SHEARS, Rotary
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss Co., E. W., Brooklyn, N. Y.
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland, O.
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Disston & Sons, Inc., Henry Tacony, Phila., Pa.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Libert Machine Co., 324 N. Roosevelt St., Green Bay, Wis.
Marshalltown Mfg. Co., 900 E. Nevada St., Marshalltown, Iowa
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Michigan Tool Co., Detroit, Mich.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.

SHEARS, Rotary (Continued)
Quickwork Co., St. Mary's, Ohio
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
United Engrg. & Fdry Co., Pittsburgh, Pa.
Williams, White & Co., Moline, Ill.

SHEARS, Squaring
Bliss Co., E. W., Brooklyn, N. Y.
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works Co., East 40th and St. Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y. (Hilles & Jones Div.)
Dodge Mfg. Corp., Mishawaka, Ind.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.
Rock River Machine Co., Janesville, Wis.
United Engrg. & Fdry Co., Pittsburgh, Pa.

SHEAVES, Belt
Dayton Rubber Mfg. Co., Dayton, Ohio
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Gates Rubber Co., Denver, Colo.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Hanson Clutch & Machinery Co., Tiffin, Ohio
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.

SHEAVES, V-Belt
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Dayton Rubber Mfg. Co., Dayton, Ohio
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Foote Gear Works, Inc., 1301 South Cicero Ave., Cicero, Ill.
Gates Rubber Co., Denver, Colo.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Miller & Co., Carl A., 2 Howard St., N. Y. C.
Winfield H. Smith, Inc., Springville, Erie County, N. Y.

SHEET PROCESSING MACHINES
McKay Machine Co., Youngstown, Ohio

SHEETS, TUBES, and RODS, PHENOLIC
Bakelite Corp., Bound Brook, N. J.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Marburg Bros, Inc., 90 West St., N. Y. C.
Synthane Corp., Oaks, Pa.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

SHELVING
Frick-Gallagher Mfg. Co., Wellston, O.
General Fireproofing Co., Youngstown, Ohio
Lyon Metal Products Co., Aurora, Ill.

SHIMS
Goodrich Company, B. F., Akron, O.
Laminated Shim Co., 21-14—44th Ave., Long Island City, N. Y.
Universal Drafting Machine Co., 1426 West Third St., Cleveland, Ohio

SHOP FURNITURE (see Furniture, Machine Shop)

SINE BARS
Ford Motor Co., Johansson Div., 3674 Schaefer Road, Dearborn, Mich.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Van Keuren Co., 12 Copeland St., Watertown, Mass.
Vinco Tool Co., 7350 Central Ave., Detroit

SKIDS (see Platforms, Skid)

SLEEVES
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Hardinge Brothers, Inc., Elmira, N. Y.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio

SLIDE RULES
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
M. Manheim Co., Inc., 15 E. 26th St., N. Y. C.,

SLOTTING ATTACHMENTS, Shapers and Planers
High Speed Hammer Co., Inc., 119 Norton St., Rochester, N. Y.

SLOTTING MACHINES
Baker Bros., Inc., Post St., Toledo, Ohio
Cochrane-Bly, 15 St. James Pl., Rochester
Consolidated Machine Tool Corp., Rochester, N. Y., (Betts Div.)
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Morton Mfg. Co., Muskegon Heights, Mich.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

SLUSHING OILS AND COMPOUNDS
Socony-Vacuum Oil Co., New York, N. Y.
Stuart Oil Co., D. A., 2727 So. Troy St., Chicago, Ill.

SOCKETS AND SLEEVES
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio

WHERE-TO-BUY DIRECTORY

SOCKETS AND SLEEVES (Continued)
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

SOLDER
Ruby Chemical Co., 68 McDowell St., Columbus, Ohio

SOLDERING FLUX, Liquid, Paste, etc.
Ruby Chemical Co., 68 McDowell St., Columbus, Ohio
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago

SOLDERING MACHINES
Frampton Electrical Equipment Co., 5th and Norwood, Dayton, Ohio
Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill.
Reiner & Campbell, Inc., 242 Lafayette St., N. Y. C.

SOLVENTS FOR OIL AND GREASE
Blakeslee & Co., G. S. Cicero Sta., Chicago, Ill.
Detroit Rex Products Co., 13005 Hillview av., Detroit, Mich.

SPECIAL MACHINERY AND TOOLS (see Contract Work)

SPEED COUNTERS
Veeder Root, Inc., Hartford, Conn.

SPEED INCREASERS
Adams Company, East Fourth Street, Dubuque, Iowa
Cullman Wheel Co., Chicago, Ill.
De Laval Steam Turbine Co., Trenton, N. J.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Foote Bros. Gear & Mach. Corp., 5301 S. Western Blvd., Chicago, Ill.
Foote Gear Works, Inc., 1301 South Cicero Ave., Cicero, Ill.
Ganschow Gear Co., 1013 W. Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2635 Canton St., Chicago, Ill.
Gerstner and Sons, H., 138 Columbia St., Dayton, Ohio
Horsburgh & Scott Co., 5114 Hamilton Ave., Cleveland, Ohio
James Mfg. Co., D. O., Chicago, Ill.
Link Belt Co., 2405 W. Hunting Post Ave., Philadelphia, Pa.
Mechanical Specialties, Inc.
Meisel Press Mfg. Co., Boston, Mass.
Palmer-Bee Co., Westminster and G.T.R.R., Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.

SPEED REDUCERS
Lee & Son Co., K. I., Aberdeen, S. D.
Norin Engrg. Co., 359 Union Park Court, Chicago
Stahl Gear & Mach. Co., Cleveland

SPEED REDUCERS, Motorized
Adams Company, East Fourth Street, Dubuque, Iowa
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Boston Gear Works, Inc., North Quincy, Ill.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Cullman Wheel Co., 1349 Altgeld St., Chicago, Ill
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Diehl Mfg. Co., Elizabethport, N. J.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Foote Gear Works, Inc., 1301 South Cicero Ave., Cicero, Ill.
Foote Bros. Gear & Mach. Corp., 5301 S. Western Blvd., Chicago, Ill.
Ganschow Gear Co., 1007 W. Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2630 Canton St., Chicago, Ill.
James Mfg. Co., D. O. Chicago, Ill.
Janette Mfg. Co., 556 W. Monroe St., Chicago, Ill.
Link-Belt Co., 2405 W. Hunting Post Ave., Philadelphia, Pa.
Mechanical Specialties, Inc., 2630 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
New Departure Div., General Motors Corp., Bristol, Conn.
Ohio Gear Co., 1333 E. 179th St., Cleveland, O.
Philadelphia Gear Works, Philadelphia, Pa.
Palmer-Bee Co., Westminster and G.T.R.R., Detroit, Mich.
Reliance Elec. & Engrg. Co., 1088 Ivanhoe Rd., Cleveland, Ohio
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Sterling Electric Motors, Telegraph Road, Los Angeles, Calif.
U. S. Electrical Motors, Inc., Los Angeles
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SPEED REDUCERS, Plain
Adams Company, East Fourth Street, Dubuque, Iowa
Bodine Electric Co., 2264 W. Ohio St., Chicago, Ill.
Boston Gear Works, Inc., North Quincy, Ill.
Colonial Broach Co., Detroit, Mich.

SPEED REDUCERS, Plain (Continued)
Cullman Wheel Co., 1349 Altgeld St., Chicago, Ill.
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
De Laval Steam Turbine Co., Trenton, N. J.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Foote Gear Works, Inc., 1301 South Cicero Ave., Cicero, Ill.
Ganschow Gear Co., 1007 W. Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2630 Canton St., Chicago, Ill.
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Grant Gear Works, Inc., 154 W. Second St., South Boston, Mass.
Horsburgh & Scott Co., 5114 Hamilton Ave., Cleveland, Ohio
James Mfg. Co., D. O., Chicago, Ill.
Janette Mfg. Co., 556 W. Monroe St., Chicago, Ill.
Link-Belt Co., 2045 N. Hunting Park Ave., Phila.
Mechanical Specialties, Inc., 2630 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Michigan Tool Co., Detroit, Mich.
Morse Chain Co., Ithaca, N. Y.
Ohio Gear Co., 1333 E. 179th St., Cleveland
Palmer-Bee Co., Westminster and G.T.R.R., Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.
Sier-Bath Gear Co., New York, N. Y.
Smith, Inc., Winfield H., Springville, Erie County, New York
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SPINDLES, Drilling & Tapping Machines
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.

SPINDLES, Hollow Bored
American Hollow Boring Co., 19th and Raspberry Sts., Erie, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.

SPINDLES, Motorized
Majestic Tool & Mfg. Co., Detroit, Mich.

SPLINE CUTTERS
Fellows Gear Shaper Co., Springfield, Vt.

SPLINE GAGES
Michigan Tool Co., Detroit
National Broach Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Pratt & Whitney, Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Vinco Tool Co., 7350 Central Ave., Detroit

SPOT WELD TIMERS
Cutler Hammer Inc., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 East 79th St., Cleveland, Ohio
Square D Electric Co., 710 S. 3rd St., Milwaukee, Wis.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

SPROUTS, Magnetic
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

SPRAY PAINTING EQUIPMENT
Binks Mfg. Co., 3114 Carroll Ave., Chicago
De Vilbiss Company, 300 Phillips Ave., Toledo
Saylor Beall Mfg. Co., Detroit, Mich.
Spray Engineering Co., 114 Central St., Somerville, Mass.

SPRING WASHERS
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio
Eaton Mfg. Co., Massillon, Ohio
Hobbs Mfg. Co., Worcester, Mass.
Philadelphia Steel & Wire Corp., Germantown, Phila., Pa.
National Lock Washer Company, Newark, N. J., and Milwaukee, Wis.
Positive Lock Washer Co., Newark, N. J.
Washburn Company, Worcester, Mass.

SPRING WIRE
American Brass Co., Waterbury, Conn.
Bethlehem Steel Co., Bethlehem, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Detroit Tap & Tool Co., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Page Steel & Wire Div. Amer. Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

SPRINGS, Extension, Compression, Torsion or Flat
Wickwire Spencer Steel Co., New York City

SPROCKETS
Adams Company, East Fourth St., Dubuque, Iowa
American Manganese Steel Div., 389 E. 14th St., Chicago Heights, Ill.
Bilgram Gear & Machine Works, 1235 Spring Garden St., Philadelphia, Pa.

SPROCKETS (Continued)
Boston Gear Works, Inc., North Quincy, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Gear Co., 1825 Reading Road, Cincinnati, Ohio
Cullman Wheel Co., 1349 Altgeld St., Chicago
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Grant Gear Works, Inc., 154 W. Second St., South Boston, Mass.
Horsburgh & Scott Co., 5114 Hamiltton Ave., Cleveland Ohio
James Mfg. Co., D. O., Chicago, Ill.
Link-Belt Co., 300 W. Pershing Rd., Chicago
Massachusetts Gear & Tool Co., 25 Nashua St., Woburn, Mass.
Meisel Press Mfg. Co., Boston, Mass.
Morse Chain Co., Ithaca, N. Y.
Philadelphia Gear Works, Philadelphia, Pa.
Power Transmission Council, 1 Atlantic St., Stamford, Conn.
Savage Co., W. J., 912 Clinch St., Knoxville, Tenn.
Slaysman and Co., 813 E. Pratt St., Baltimore
Sun Oil Co., Philadelphia, Pa.
Winfield H. Smith, Inc., Springville, Erie County, N. Y.

SQUARES
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Lufkin Rule Co., The, Saginaw, Mich.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Stanley Tools, New Britain, Conn.
Starrett Co., The L. S., Crescent St., Athol, Mass.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Vinco Tool Co., 7350 Central Ave., Detroit

STAMPINGS, Fibre
Continental Diamond Fibre Co., Newark, Del.

STAMPINGS, Metal
American Brass Co., Waterbury, Conn.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Dodge Mfg. Corp., 505 S. Huron St., Mishawaka, Ind.
Laminated Shim Co. Inc., 21-44th Ave., Long Island City, N. Y.
Metalcraft Mfg. Corp., H. K., 390 Second Ave., N. Y. C.
Powell Pressed Steel Co., Hubbard, Ohio
Revere Copper & Brass Inc., 230 Park Ave., New York City
Seamless Prod. Co., Inc., 113 W. 42nd St., N. Y. C.
Sundstrand Machine Tool Co., Rockford, Ill.

STAMPS, Steel
Bates, H. O., Barclay St., N. Y. C.
Danly Machine Specialties, Inc., Chicago, Ill.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Noble & Westbrook Mfg. Co., 20 Westbrook St., East Hartford, Conn.
Numberall Stamp and Tool Co., Huguenot Park, Staten Island, N. Y.
Seamless Prod. Co., Inc., 113 W. 42nd St., N. Y. C.

STARTERS—Automatic A. C. and D. C. (See Controllers and Starters, Motor)

STAYBOLTS
Bethlehem Steel, Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

STEEL, Alloy
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Ingersoll Steel & Disc Div. Borg-Warner Corp., P. O. Box 272, Newcastle, Ind.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 88, Watervliet, N. Y.
Milne and Co. A., 741 Waashington St., New York, N. Y.
Monarch Steel Co., Indianapolis, Ind.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh
Republic Steel Corp., Republic Bldg., Cleveland
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Stoody Co., Whittier, Calif.
Timken Steel & Tube Div. of Timken Roller Bearing Co., Canton, O.
Universal Steel Co., Bridgeport, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.

STEEL, Alloy, Cold Drawn
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.

WHERE-TO-BUY DIRECTORY

STEEL, Alloy, Cold Drawn (Continued)
Firth-Sterling Steel Co., McKeesport, Pa.
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Div. of Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Co., Massillon Ohio. (Div. of Republic Steel Corp.)
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.
Wycoff Drawn Steel Co., Box 1256, First National Bank Bldg., Pittsburgh, Pa.

STEEL, Carbon
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Phila.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Jessop Steel Co., Washington, Pa.
Jones & Lamson Machine Co., Springfield, Vt.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Milne and Co. A., 741 Washington St., N. Y. C.
Monarch Steel Co., Indianapolis, Ind.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Republic Steel Corp., Republic Bldg., Cleveland
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Stoody Co., Whittier, Calif.
Timken Steel & Tube Div. of Timken Roller Bearing Co., Canton, O.
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.

STEEL, Cold Drawn
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y.
Carpenter Steel Co., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Monarch Steel Co., Indianapolis, Ind.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Div. of Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Co., Massillon, Ohio. (Div of Republic Steel Corp.)
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.
Wyckoff Drawn Steel Co., Box 1256, First National Bank Bldg., Pittsburgh, Pa.

STEEL, Cold Rolled
American Rolling Mill Co., Curtis Ave., Middletown, Ohio
American Sheet & Tin Plate Co., Pittsburgh, Pa.
American Tube & Stamping Co., New Britain
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa., and Chicago, Ill.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Phila.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 Ligonier St., Latrobe, Pa.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Thomas Steel Co., Warren, Ohio
Timken Steel & Tube, Div. of Timken Roller Bearing, Co., Canton, O.
Universal Steel Co., Bridgeville, Pa.

STEEL, Die
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.

STEEL, Die (Continued)
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Milne and Co. A., 741 Washington St., N. Y. C.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube, Div. of Timken Roller Bearing Co., Canton, O.
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloy Steel Co., 2500 Grant Bl., Pittsburgh, Pa.

STEEL, Electrical, Strip and Sheet
American Rolling Mill Co., Curtis Ave., Middletown, Ohio
American Sheet & Tin Plate Co., Pittsburgh
Carnegie-Illinois Steel Corp., Pittsburgh, Pa., and Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio

STEEL, High Speed
Anchor Drawn Steel Co., Pittsburgh, Pa.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Phila.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div. Borg-Warner Corp., P. O. Box 272, Newcastle, Ind.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Milne and Co. A., 741 Washington St., N. Y. C.
Monarch Steel Co., Indianapolis, Ind.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Stoody Co., Whittier, Calif.
Timken Steel & Tube Div. of Timken Roller Bearing Co., Canton, O.
Universal Steel Co., Bridgeville, Pa.
Vascoloy Ramet Div. of Vanadium Alloys Steel Co., No. Chicago, Ill.

STEEL, Magnet
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio

STEEL, Screw
Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Phila.
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Monarch Steel Co., Indianapolis, Ind.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Div. of Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Co., Massillon, Ohio Div. Republic Steel Corp.
Universal Steel Co., Bridgeville, Pa.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL, Sheets
American Rolling Mill Co., Curtis Ave., Middletown, O.
American Sheet & Tin Plate Co., Pittsburgh
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa. and Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.

STEEL, Stainless
Acme Steel Co., 2840 Archer Ave., Chicago, Ill.
American Rolling Mill Co., Curtis Ave., Middletown, Ohio
American Sheet & Tin Plate Co., Pittsburgh
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.

STEEL, Stainless (Continued)
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Phila.
Firth-Sterling Steel Co., McKeesport, Pa.
General Alloys Co., 367 W. 1st St., Boston
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Ingersoll Steel & Disc Div. Borg-Warner Corp., P. O. Box 272, Newcastle, Ind.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.
Steel & Tubes, Inc. (Sub. of Republic Steel Corp.), Cleveland, Ohio
Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Co., Massillon, Ohio (Div. of Republic Steel Corp.)
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bldg., Pittsburgh, Pa.

STEEL, Strip
Acme Steel Co., 2840 Archer Ave., Chicago, Ill.
American Rolling Mill Co., Curtis Ave., Middletown, O.
American Sheet & Tin Plate Co., Pittsburgh
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co., of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Thomas Steel Co., Warren, Ohio
Universal Steel Co., Bridgeville, Pa.

STEEL, Tool
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Ingersoll Steel & Disc. Div. Borg-Warner Corp., P. O. Box 272, Newcastle, Ind.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Milne and Co. A., 741 Washington St., N. Y. C.
Prosser & Son, Thomas, 120 Wall St., N. Y. C
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bldg., Pittsburgh, Pa.

STOCKS, Die
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools Inc., 1937 Amma Ave., Warren, Ohio
Butterfield Div. (Union Twist Drill Co.) Derby Line, Vt.
S. W. Card Mfg. Co. (Div. Union Twist Drill Co.), Mansfield, Mass.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Oster Mfg. Co., The, 2057 East 61st Place, Cleveland, Ohio
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo, Ohio

STORAGE Batteries, Electric
Electric Storage Battery Co., Philadelphia

STRAIGHT EDGES
Atkins, E. C. and Co., 402 S. Illinois St., Indianapolis, Ind.
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston & Sons, Inc., Henry, Tacony, Phila.
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.

WHERE-TO-BUY DIRECTORY

STRAIGHT EDGES (Continued)
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Mass.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Turner Devices, Inc., 1212A Mississippi Ave., St. Louis, Mo.

STRAIGHTENING MACHINERY
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, Ohio
Concolidated Machine Tool Corp., Rochester, N. Y. (Hilles & Jones Div.)
General Manufacturing Co., 6430 Farnsworth Ave., Detroit, Mich.
Schuyler, W. A., 250 West 57th St., N. Y. C.
U. S. Tool Co., Inc., Ampere, N. J.
Waterbury Farrel Foundry & Mach. Co., Waterbury, Conn.
Watson-Stillman Co., Roselle, N. J.

STRAINERS, Coolants and Lubricants (see Filters)

STRIPPER BOLTS, Socket Head
Danly Mach. Spec. Inc., Chicago
Holo-Krome Screws Corp., The, Hartford
Parker-Kalon Corp., 200 Varick St., N. Y. C.
Products Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio

STRIPPER UNITS
Strippit Corp., 1559 Niagara St., Buffalo, N. Y.

STRIPPERS FOR PAINT, LACQUER, AND ENAMEL FINISHES
Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich.

STUD SETTERS
Apex Mach. & Tool Co., Dayton, Ohio
Black & Decker Mfg. Co., 716 Pennsylvania Ave., Towson, Md.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Consolidated Machine Tool Corp., Rochester, N. Y. (Modern Tool Works)
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

STUDS
Parker-Kalon Corp., 200 Varick St., N. Y. C.

SUB HEADSTOCKS for Engine Lathes
Hendey Machine Co., Torrington, Conn.

SUB PRESS DIES
Waltham Machine Works, Waltham, Mass.

SUB PRESSES and Die Sets
Baumbach Mfg. Co., E. A., Chicago, Ill.
Danly Machine Specialties Inc., Chicago, Ill.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Strippit Corp., 1559 Niagara St., Buffalo, N. Y.
U. S. Tool Co., Inc., Ampere, N. J.
Waltham Machine Works, Waltham, Mass.

SURFACE BROACHING MACHINES
American Broach Machine Co., 415 W. Huron St., Ann Arbor, Mich.
Cincinnati Milling Machine Co. (Cinn-Gardner, Inc.), Cincinnati, Ohio
Foote-Burt Co., The, 1300 St. Clair Ave., Cleveland, Ohio

SURFACE PLATES
Brown & Sharpe Mfg. Co., Providence, R. I.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Challenger Mchry. Co., Grand Haven, Mich.
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Knu-Vise Products Co. Inc., 6432 Cass Ave., Detroit, Mich.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
U. S. Tool Co., Inc., Ampere, N. J.
Western Tool & Mfg. Co., Springfield, Ohio

SWAGING MACHINES
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Etna Machine Co., Toledo, Ohio
Hardinge Brothers, Inc., Elmira, N. Y.
Langelier Mfg. Co., 51 Washington Ave., Cranston, R. I.
Torrington Co., The, Field St., Torrington, Conn.
Waterbury Farrel Foundry & Mach. Co., Waterbury, Conn.

SWITCHES, Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Arrow-Hart & Hegeman Elec. Co., 103 Hawthorne St., Hartford, Conn.
Burgess Laboratories, C. F., Inc., Freeport, Ill.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Cutler Hammer, Inc., 315 N. 12th St., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio
General Electric Vapor Lamp Co., 410 Eighth St., Hoboken, N. J.
Hart Mfg. Co., Hartford, Conn.
L-W Chuck Co., Toledo, O.
Lincoln Electric Co., 12818 Coit Rd. Cleveland

SWITCHES, Electric (Continued)
Monitor Controller Co., Gay, Lombard and Frederick Sts., Baltimore, Md.
Ohio Brass Co., Mansfield, Ohio
Production Instrument Co., 1325 So. Wabash Ave., Chicago, Ill.
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.
Ward Leonard Elec. Co., 37 South St., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SWITCHES, Limit
Monitor Controller Co., Baltimore, Md.

SWITCHBOARDS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SYNTHETIC FINISHES
Roxalin Flexible Lacquer Co., Box A, Elizabeth, N. J.

TABLES, Circular
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
George Gorton Machine Co., 1107 13th St., Racine, Wis.
Knight Machinery Co., W. B., 3920 W. Pine Blvd., St. Louis, Mo.

TABLES, DRILL, ROLL, Etc.
Thomas Machine Mfg. Co., Pittsburgh, Pa.

TACHOMETERS
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Phila., Pa.
Consolidated Ashcroft Hancock Co., Inc., Bridgeport, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Veeder-Root, Inc., Hartford, Conn.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.

TANKS, Quenching
American Gas Furnace Co., Elizabeth, N. J.
Koven & Bros., Inc., L. O., Jersey City, N. J.
Strong, Carlisle & Hammond Mach. Co., Cleveland, Ohio

TAP EXTRACTORS, Broken
Walton Co., The, Hartford, Conn.

TAP HOLDERS
Alco Tool Co., Bridgeport, Conn.
Bausch Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
S. W. Card Mfg. Co., (Div. Union Twist Drill), Mansfield, Mass.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Ettco Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
McCrosky Tool Corp., Meadville, Pa.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
National Automatic Tool Co., Richmond, Ind.
Procunier Safety Chuck Co., 14 S. Clinton, Chicago, Ill.
Sculley-Jones & Co., Rockwell & 19th St., Chicago, Ill.

TAPER PIN REAMERS, (see Reamers, Taper Pin Hole

TAPER PINS
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio

TAPES, Insulating
Bakelite Corp., Bound Brook, N. J.
Continental Diamond Fibre Co., Newark, Del.
B. F. Goodrich Co., 576 South Main St., Akron, Ohio
Johns-Manville, 22 E. 40th St., N. Y. C.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPES, Measuring
Lufkin Rule Co., The, Saginaw, Mich.
Starrett Co., The L. S., Crescent St., Athol, Mass.

TAPPERS, Portable
Black & Decker Mfg. Co., Towson, Md.
Chicago Pneumatic Tool Co., 5 E. 44th St., New York, N. Y.
Ettco Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.
White Dental Mfg. Co., S. S., Philadelphia, Pa.

TAPPING ATTACHMENTS
Burns Mfg. Corp., E. Reed, 21 Jackson St., Brooklyn, N. Y.
Murchey Mach. & Tool Co., Detroit, Mich.

TAPPING HEADS
Barnes Co., W. F. & John, Rockford, Ill.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.

TAPPING HEADS (Continued)
Boice Crane Co., Toledo, Ohio
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Ettco Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
Greenlee Bros. & Co., Twelfth St. and Columbia Ave., Rockford, Ill.
Hoefer Mfg. Co., 213 S. Chicago Ave., Freeport, Ill.
Jarvis Co., Chas. L., Middletown, Conn.
Kingsbury Machine Tool Co., Keene, N. H.
Leland-Gifford Co., Worcester, Mass.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind
National Automatic Tool Co., S. 7th and N. Sts., Richmond, Ind.
Procunier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Rockford Drilling Machine Co., Rockford, Ill.

TAPPING MACHINES
Acme Machinery Co., 4533 St. Clair Ave., Cleveland, O.
Allen Co., Chas. G., Barre, Mass.
Ames Co., B. C., Waltham, Mass.
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Avey Drilling Machine Co., Cincinnati, O.
Baker Bros., Inc., Post St., Toledo, O.
Barnes Co., W. F. & John, Rockford, Ill.
Barnes Drill Co., 814 Chestnut St., Rockford, Ill.
Bausch Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bodine Corp., 1720 Fairfield Ave., Bridgeport, Conn.
Boice Crane Co., Toledo, Ohio
Bradford Machine Tool Co., 657 Evans St., Cincinnati, O.
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Chicago Pneumatic Tool Co., 6 E. 44th St., N. Y. C.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, O.
Cross Gear & Machine Co., 3250 Belluvue, Detroit, Mich.
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Dreses Machine Tool Co., 3366 Beekman St., Cincinnati, O.
Ettco Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, O.
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Frew Machine Co., 126 West Venango St., Philadelphia, Pa.
Goss & deLeeuw Machine Co., New Britain, Conn.
Greenlee Bros. & Co., Twelfth St., and Columbia Ave., Rockford, Ill.
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Index Machinery Corp., 49 Central Ave., Cincinnati, O.
Charles L. Jarvis Co., Middletown, Conn.
Kingsbury Machine Tool Co., Keene, N. H.
Leland-Gifford Co., Worcester, Mass.
Marburg Bros. Inc., 90 West St., N. Y. C.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Moline Tool Co., Worcester, Mass.
Murchey Mach. & Tool Co., Detroit
National Acme Co., 170 E. 131st St., Cleveland
National Automatic Tool Co., South 7th and N. Sts., Richmond, Indiana
National Machinery Co., Tiffin, O.
Procunier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Rickert-Shafer Co., 613 West 11th St., Erie, Pa.
Start Tool Co., Waltham, Mass.
Waterbury Farrell Foundry & Mach. Co., Waterbury, Conn.
Whitney Metal Tool Co., Rockford, Ill.

TAPPING MACHINES, Multiple Spindle
Avey Drilling Machine Co., Inc., Cincinnati, O.
Baker Bros., Post St., Toledo, O.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
W. F. & John Barnes, Rockford, Ill.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Buhr Mach. Tool Co., Ann Arbor, Mich.
Defiance Machine Works, Defiance, O.
Delta Mfg. Co., 600 E. Vienna St., Milwaukee
Dreses Machine Tool Co., 3366 Beekman St., Cincinnati, O.
Ettco Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, O.
Goss & deLeeuw Machine Co., New Britain, Conn.
Greenlee Bros. & Co., Twelfth St., and Columbia Ave., Rockford, Ill.
Hamilton Tool Co., Hamilton, O.
Index Machinery Corp., 49 Central Ave., Cincinnati, O.

WHERE-TO-BUY DIRECTORY

Ingersoll Milling Machines Co., Rockford, Ill.
Millholland Sales & Mach. Co., 936 E. Georgia St., Indianapolis, Ind.
Moline Tool Co., 102-20th St., Moline, Ill.
National Automatic Tool Co., South 7th and N. Sts., Richmond, Ind.
National Machinery Co., Tiffin, O.

TAPS and DIES
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Card Mfg. Co., S. W. (Div. Union Twist Drill), Mansfield, Mass.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Geometric Tool Co., Blake & Valley Sts., New Haven, Conn.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Landis Machine Co., Inc., Church & 5th Sts., Waynesboro, Pa.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
National Acme Co., Cleveland, O.
National Twist Drill & Tool Co., Detroit, Mich.
Pipe Machinery Co., 930 E. 70th St., Cleveland, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Winter Bros. Co., Wrentham, Mass.

TAPS, Collapsing
Consolidated Machine Tool Corp., Rochester, N. Y. (Modern Tool Wks.)
Geometric Tool Co., Blake & Valley Sts., New Haven, Conn.
Landis Machine Co., Inc., Church & 5th Sts., Waynesboro, Pa.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
National Acme Co., Cleveland, O.
Pipe Machinery Co., 930 E. 70th St., Cleveland, O.
Rickert-Shafer Co., 613 West 11th St., Erie, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

TAPS, Ground
John Bath & Co., Inc., 18 Grafton St., Worcester, Mass.
Charles H. Besly & Co., 118-124 North Clinton St., Chicago, Ill.
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Card Mfg. Co., S. W. (Div. Union Twist Drill), Mansfield, Mass.
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Winter Bros. Co., Wrentham, Mass.

TEMPLATE COATING
Dayton Rogers Co., Minneapolis, Minn.
Dykem Co., The, 2301 N. Eleventh St., St. Louis, Mo.

TESTING APPARATUS, Hardness
Magna Flux Corp., 605 W. Washington St., Chicago, Ill.
Tinius Olsen Testing Machine Co., 500 N. 12th St., Phila., Pa.
Shore Instrument and Mfg. Co., Jamaica, N. Y.
Thwing-Albert Instrument Co., 3337 Lancaster Ave., Phila., Pa.
Wilson Mechanical Instrument Co., 383 Concord Ave., New York, N. Y.

TESTING APPARATUS, Oil
Tagliabue Mfg. Co., C. J., Park & Nostrand Aves., Brooklyn, N. Y.

TESTING APPARATUS, Paint
Taber Instrument Co., North Tonawanda, N. Y.

TESTING APPARATUS, Stiffness
Taber Instrument Co., North Tonawanda, N. Y.

TESTING MACHINES, Spring
American Mach. & Metals Inc., 100 Sixth Ave., N. Y. C.
Link Engrg. & Mfg. Co., 1054 W. Baltimore Ave., Detroit, Mich.

TESTING MACHINES, Universal
American Mach. & Metals Inc., 100 Sixth Ave., N. Y. C.
Link Engrg. & Mfg. Co., 1054 W. Baltimore Ave., Detroit, Mich.
Tinius Olsen Testing Machine Co., 500 N. 12th St., Phila., Pa.

THERMOCOUPLES
Brown Instrument Co., Phila., Pa.

THERMOMETERS
American Schaeffer & Budenberg Div. Consolidated Ashcroft Hancock Co., Bridgeport, Conn.
Bristol Company, Waterbury, Conn.
Brown Instrument Co., Phila., Pa.

THERMOMETERS (Continued)
Consolidated Ashcroft Hancock Co., Inc., Bridgeport, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Illinois Testing Lab., Inc., 420 N. LaSalle St., Chicago
Leeds & Northrup Co., 4934 Stenton Ave., Phila., Pa.
Marsh Corp., Jas. P., 2073 Southport Ave., Chicago
Partlow Corp., New Hartford, N. Y.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, O.
Tagliabue Mfg. Co., C. J., Park & Nostrand Aves., Brooklyn, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford, Conn.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.

THREAD-CUTTING MACHINES
Acme Machinery Co., 4533 St. Clair Ave., Cleveland, O.
Automatic Machine Company, Bridgeport, Conn.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, O.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Consolidated Mach. Tool Corp., Rochester (Modern Tool Wks.)
Eastern Machine Screw Corp., Truman & Barclay Sts., New Haven, Conn.
Geometric Tool Co., Blake & Valley Sts., New Haven, Conn.
Goss & deLeeuw Machine Co., New Britain, Conn.
Grant Mfg. & Machine Co., 90 Silliman Ave., Bridgeport, Conn.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Landis Machine Co., Inc., Church & 5th Sts., Waynesboro, Pa.
Merrel Mfg. Co., 100 Curtis St., Toledo, Ohio
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
National Machinery Co., Greenfield St., Tiffin, O.
Oster Mfg. Co., 2057 East 61st Place, Cleveland, O.
Pipe Machinery Co., 930 E. 70th St., Cleveland, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rickert-Shafer Co., 613 West 11th St., Erie, Pa.
Scherr Co., Geo., 128 Lafayette St., N. Y. C.
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo, O.

THREAD-CUTTING TOOLS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, O.
Butterfield Div. (Union Twist Drill Co.) Derby Line, Vt.
Card Mfg. Co., S. W. (Div. Union Twist Drill Co.), Mumford Ave., Mansfield, Mass.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, O.
Colonial Broach Co., Detroit, Mich.
Consolidated Mach. Tool Corp., Rochester (Modern Tool Wks.)
Detroit Tap & Tool Co., Detroit, Mich.
Eastern Machine Screw Corp., Truman & Barclay Sts., New Haven, Conn.
Errington Mechanical Lab., 24 Norwood Ave., Stapleton, N. Y.
Geometric Tool Co., Blake & Valley Sts., New Haven, Conn.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Church & 5th Sts., Waynesboro, Pa.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
National Acme Co., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Oster Mfg. Co., The, 2057 East 61st Place, Cleveland, O.
Pipe Machinery Co., 930 E. 70th St., Cleveland, O.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Prosser & Sons, Thos., 15 Gold St., N. Y. C.
Rickert-Shafer Co., 613 West 11th St., Erie, Pa.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo, O.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.
Western Tool & Mfg. Co., Springfield, O.

THREAD CUTTING TOOLS
Cemented Carbide (see Tools, Cemented Carbide)

THREAD, Gages
(see Gages, Thread)

THREAD GENERATING MACHINES
Fellows Gear Shaper Co., 78 River St., Springfield, Vermont

THREAD GRINDING MACHINES
Ex-Cello-O Corp., 1200 Oakman Blvd., Detroit, Mich.

THREAD GRINDING MACHINES (Continued)
Jones & Lamson Machine Co., Springfield, Vt.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Triplex Mach. Tool Corp., 125 Barclay St., N. Y. C.

THREAD-MILLING MACHINES
Adams Company, East Fourth St., Dubuque, Iowa
Automatic Machine Company, Bridgeport, Conn.
Grob Brothers, West Allis, Wis.
Hall Planetary Co., Fox Street, Phila., Pa.
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Heller Machine Co., 114 Liberty St., N. Y. C.
Lees-Bradner Co., 6210 Carnegie Ave., Cleveland, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 900 Housatonic Ave., Bridgeport, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., N. Y. C.
Taft-Pierce Mfg. Co., Woonsocket, R. I.
Triplex Mach. Tool Corp., 125 Barclay St., N. Y. C.
Waltham Machine Works, Waltham, Mass.

THREAD-ROLLING MACHINES
Bliss Co., E. W., 53rd St. and 2nd Ave., Brooklyn, N. Y.
National Machinery Co., Greenfield St., Tiffin, O.
V. & O. Press Company, Union Turnpike, Hudson, N. Y.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

THUMB TACKS
Universal Drafting Machine Co., 1426 West Third St., Cleveland, O.

TIERING TRUCKS
Automatic Transportation Co., 59 West 87th St., Chicago, Ill.

TIMING DEVICES
Automatic Temperature Control Co., Inc., 34 E. Logan St., Phila., Pa.
Stillman Co., Inc., M. J., 116 S. Michigan Ave., Chicago

TIN PLATE
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa., and Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, O.

TIRE SETTERS
West Tire Setter Co., 309 Exchange St., Rochester, N. Y.

TOGGLES, Pressure for Presses
Knu-Vise Products Co. Inc., 6432 Cass Ave., Detroit, Mich.
Toledo Machine Tool Co., Toledo, O.
V. & O. Press Company, The Union Turnpike, Hudson, N. Y.

TONGS, Lifting
Heppenstall Co., 4620 Hatfield St., Pittsburgh

TOOL BITS
Anchor Drawn Steel Co., Pittsburgh, Pa.
American Cutting Alloys, Inc., N. Y. C.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Barber-Colman Co., Rockford, Ill.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Colonial Broach Co., Detroit, Mich.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York
Detroit Tap & Tool Co., Detroit, Mich.
Dis-ton & Sons, Inc., Henry, Tacony, Phila.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Gisholt Machine Co., Madison, Wis.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Michigan Tool Co., Detroit, Mich.
Ready Tool Co., 550 Iranistan Ave., Bridgeport, Conn.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Union Twist Drill Co., Athol, Mass.
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.
Vincent Steel Process Co., 2434 Bellevue Ave., Detroit, Mich.

TOOL BITS, Cemented Carbide
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Bethlehem Steel Co., Bethlehem, Pa.

WHERE-TO-BUY DIRECTORY

TOOL BITS, Cemented Carbide (Continued)
Carboly Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Crafts Co., Inc., Arthur A., 532 Commonwealth Ave., Boston, Mass.
Firth-Sterling Steel Co., McKeesport, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Michigan Tool Co., Detroit
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Stoody Co., Whittier, Calif.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Tungsten Carbide Tool Co., Detroit
Tungsten Elec. Corp., 540-39th St., Union City, N. J.

TOOL CASES
Berger Mfg. Co. (Sub. of Republic Steel Corp.), Canton, O.
Frick-Gallagher Mfg. Co., Wellston, Ohio
Gerstner H. & Sons, 138 Columbia St., Dayton, O.

TOOL CHESTS
Bergen Mfg. Co. (Sub. of Republic Steel Corp.), Canton, O.
Gerstner, H. & Sons, 138 Columbia St., Dayton, Ohio
Lufkin Rule Co., Saginaw, Mich.
Stanley Tools, New Britain, Conn.
Western Tool & Mfg. Co., Springfield, O.

TOOL HOLDERS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, O.
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Four-Grip Tool Co., 115 E. 17th St., Paterson, N. J.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Gisholt Machine Co., 1301 E. Washington Ave., Madison, Wis.
Michigan Tool Co., Detroit, Mich.
O. K. Tool Co., Shelton, Conn.
Ready Tool Co., Bridgeport, Conn.
Wesson Co., Detroit, Mich.
Western Tool & Mfg. Co., Springfield, O.
Williams & Co., J. H., 75 Spring St., N. Y. C.

TOOL POSTS, Lathe
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Four-Grip Tool Co., 155 E. 17th St., Paterson, N. J.
Gerstner and Sons, H., 138 Columbia St., Dayton, Ohio
Gisholt Machine Co., Madison, Wis.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
McCroskey Tool Corp., 1340-80 South Main St., Meadville, Pa.
Michigan Tool Co., Detroit, Mich.
O. K. Tool Co., Shelton, Conn.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Stark Tool Co., Waltham, Mass.

TOOL ROOM LATHES (see Lathes, Tool Room)

TOOL STEEL (see Steel, Tool)

TOOL WORK (see Contract Work)

TOOLS, Carbide Alloy
American Cutting Alloys, Inc., N. Y. C.

TOOLS, Cemented-Carbide
Anchor Drawn Steel Co., Pittsburgh, Pa.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Barber-Colman Co., 1200 River St., Rockford, Ill.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Cimatool Co., Dayton, O.
Michogan Tool Co., Detroit, Mich.
Colonial Steel Co., Pittsburgh, Pa.
Crafts Co., Inc., Arthur A., 532 Commonwealth Ave., Boston, Mass.
Detroit Tap & Tool Co., Detroit, Mich.
Disston and Sons, Inc., Henry, Tacony St., Phila., Pa.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Firth-Sterling Steel Co., McKeesport, Pa.
Gairing Tool Co., 1629 Lafayette Blvd., Detroit
Heald Machine Co., New Bond St., Worcester, Mass.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Production Tool Co., 6474 LeGrande Ave., Detroit, Mich.
Scully-Jones & Co., Rockwell & 19th St., Chicago, Ill.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Tungsten Carbide Tool Co., Detroit
Tungsten Elec. Corp., 540-39th St., Union City, N. J.
Vanadium Alloys Steel Co., 2400 Grant Bldg., Pittsburgh, Pa.
Wesson Co., Detroit, Mich.

TOOLS, Cutting-off (see Cutting-Off Tools

TOOLS, Diamond
Crafts Co., Inc., Arthur A., 532 Commonwealth Ave., Boston, Mass.
Desmond-Stephan Mfg. Co., Urbana, O.
Gilmore & Co., F. F., 112 Dartmouth St., Boston, Mass.
Gorton Machine Co., George, 1107 13th St., Racine, Wis.
Kershaw, F. A., Kent, Ohio
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Wheel Trueing Tool Co., Detroit, Mich.

TOOLS, Hand
Bonney Forge & Tool Works, Allentown, Pa.

TOOLS, Lathe, Shaper and Planer
American Tool Works Co., Pearl & Eggleston Aves., Cincinnati, Ohio
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Gisholt Machine Co., 1301 E. Washington Ave., Madison, Wis.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Haynes Stellite Co., Kokomo, Indiana
Michigan Tool Co., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Ready Tool Co., 550 Iranistan Ave., Tool & Mfg. Co., Springfield, O.
Tungsten Carbide Tool Co., Detroit
Williams & Co., J. H., 75 Spring St., N. Y.

TOOLS, Safety Non-Sparking
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Stanley Tools, New Britain, Conn.

TOOLS TURNING
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
R. & L. Tools, Nicetown, Phila., Pa.

TORCH, Portable Gas
Air Reduction Sales Company, 60 East 42nd St., N. Y. C.
American Gas Furnace Co., Elizabeth, N. J.
Hones, Inc., Chas A., 121 S. Grand Ave., Baldwin, L. I.
Linde Air Products Co., Inc., N. Y. C.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Stark Tool Co., Waltham, Mass.

TRACTORS, Electric and Gasoline
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Automatic Transportation Co., 59 West 87th St., Chicago, Ill.
Baker-Raulang Co., 2164 W. 25th St., Cleveland
Elwell-Parker Electric Co., 4511 St. Clair Ave., Cleveland, O.
Hebard and Co., W. F., 433 S. Jefferson St., Chicago, Ill.
Mercury Mfg. Co., 4044 South Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., Philadelphia Division, 4530 Tacony St., Phila., Pa.

TRAILERS, Factory, Warehouse, etc.
All Steel Welded Truck Corp., 1139 Railroad Ave., Rockford, Ill.
Clark Equip. Co., Battle Creek, Mich.
Easton Car & Const. Co., Easton, Pa.
Mercury Mfg. Co., 4044 South Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Phila., Pa.

TRAMRAILS
American Mono-Rail Co., 13113 Athens Ave., Cleveland, Ohio
Cleveland Crane & Engrg. Co., Wickliffe, O.
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

TRANSFORMERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
De Laval Steam Turbine Co., Trenton, N. J.
Forbes & Myers, 170 Union St., Worcester, Mass.
General Electric Co., Schenectady, N. Y.
Jefferson Electric Co., Bellewood, Ill.
Martin Electric Co., 705 Pequette St., Detroit
Progressive Welder Co., 737 Piquette Ave., Detroit, Mich.
Raytheon Mfg. 190 Willow St., Waltham, Mass.
Wagner Electric Corp., 6444 Plymouth Ave., St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TRANSMISSION EQUIPMENT
Ahlberg Bearing Co., W. 3025 47th St., Chicago, Ill.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Boston Gear Works, Inc., North Quincy, Mass.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Cullman Wheel Co., Chicago, Ill.
Dayton Rubber Mfg. Co., Dayton, Ohio
De Laval Steam Turbine Co., Trenton, N. J.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Fafnir Bearing Co., New Britain, Conn.

TRANSMISSION EQUIPMENT (Continued)
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Gates Rubber Co., Denver, Colo.
Graton & Knight Co., Worcester, Mass.
Carlyle Johnson Machine Co., 52 Main St., Manchester, Conn.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Palmer-Bee Co., Westminster and G.T.R.R., Detroit, Mich.
Philadelphia Gear Works, Erie Ave. & G St., Phila.
Production Equip. Co., 5219 Chester Ave., Cleveland
S.K.F. Industries, Inc., Phila., Pa.
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.
Slaysman & Co., 813 E. Pratt St., Baltimore
Winfield H. Smith, Inc., Springville, Erie County, N. Y.
Standard Pressed Steel Co., Jenkintown, Pa.

TRANSMISSION MACHINERY (see Hangers, Shafts, Pulleys, Clutches, Belting Chains)

TRANSMISSIONS, Hydraulic
American Engineering Co., 2407 Aramingo Ave., Phila., Pa.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Oilgear Co., 1403 W. Bruce St., Milwaukee, Wis.
Sundstrand Mach. Tool Co., Rockford, Ill.
Vickers Incorporated, 1400 Oakman Blvd., Detroit, Mich.

TRANSMISSION, Variable Speed
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Engineering Co., 2407 Aramingo Ave., Phila., Pa.
Boston Gear Works, Inc., North Quincy, Mass.
Columbia Vari-Speed Co., Liberty Bldg., Wheaton, Ill.
Earle Gear & Machine Co., 4707 Stenton Ave., Phila., Pa.
Dodge Mfg. Corp., Mishawaka, Ind.
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
Graham Transmissions, 78 River St., Springfield, Vt.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Link-Belt Co., 2045 Hunting Post Ave., Phila.
New Departure Mfg. Co., Bristol, Conn.
Oilgear Co., 1403 W. Bruce St., Milwaukee
Palmer-Bee Inc., Westminster & G.T.R.R., Detroit, Mich.
Philadelphia Gear Works, Phila., Pa.
Reeves Pully Co., Columbus, Indiana
Speedmaster Co., 1301 Washington Ave., South, Minneapolis, Minn.
Sterling Electric Motors, Telegraph, Road, Los Angeles, Calif.
U. S. Electrical Motors Inc., Los Angeles, Calif.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TREADS, Safety
Norton Company, Worcester, Mass.

TRIMMING MACHINES
Automatic Machine Company, Bridgeport, Conn.
Bliss Co., E. W., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Slaysman and Co., 813 E. Pratt St., Baltimore
Waterbury Farrel Foundry & Mach. Co., Waterbury, Conn.

TROLLEYS, I-Beam or Monorail
Amer. Chain & Cable Co., Ford Chain Block Div., Phila., Pa.
Wright Mfg. Div. Amer. Chain Co., Inc., Bridgeport, Conn.
Curtis Pneumatic Machinery Co., 1924 Kienlen Ave., St. Louis, Mo.
Round and Son, David, Newburgh Station, Cleveland, O.

TRUCKS, Factory
All Steel Welded Truck Corp., 1139 Railroad Ave., Rockford, Ill.
Automatic Transportation Co., 59 West 87th St., Chicago, Ill.
Baker-Raulang Co., 2164 W. 25th St., Cleveland, O.
Clark Equip. Co., Battle Creek, Mich.
Continental Diamond Fibre Co., Newark, Delaware
Barrett-Cravens Co., 3255 W. 30th St., Chicago
Elwell-Parker Electric Co., 4511 St. Clair Ave., Cleveland, O.
Francis Co., Charles E., Rushville, Ind.
Koven & Bros., Inc., L. O., Jersey City, N. J.
Lyon Iron Works, 71 Madison St., Greene, N. Y.
Mercury Mfg. Co., 4044 South Halsted St., Chicago, Ill.
Metzgar Co., Grand Rapids, Mich.
Oliver Machinery Co., Grand Rapids, Mich.
Pollard Bros. Mfg. Co., 4444 N. Knox Ave., Chicago, Ill.
Sabin Machine Co., 6538 Carnegie Ave., Cleveland, O.
Standard Pressed Steel Co., Jenkintown, Pa.
Western Tool & Mfg. Co., Springfield, O.
Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Phila., Pa.

TRUCKS, Gas and Electric
Easton Car and Construction Co., Easton, Pa.
Wright-Hibbard Industrial Truck Co., Phelps, N. Y.

TRUCKS, Hand Lift
All Steel Welded Truck Corp., 1139 Railroad Ave., Rockford, Ill.
Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill.
Lyon Iron Works, 71 Madison St., Greene, N. Y.

WHERE-TO-BUY DIRECTORY

TRUCKS, Hand Lift (Continued)
Metzgar Co., Grand Rapids, Mich.
Sabin Machine Co., 6538 Carnegie Ave., Cleveland, O.
Standard Pressed Steel Co., Jenkintown, Pa.
Yale & Towne Mfg. Co., Philadelphia, Div., 4530 Tacony St., Phila., Pa.

TRUCKS, Storage Battery
Automatic Transportation Co., 59 West 87th St., Chicago, Ill.
Baker-Raulang Co., 2164 W. 25th St., Cleveland, O.
Easton Car and Construction Co., Easton, Pa.
Elwell-Parker Electric Co., 4511 St. Clair Ave., Cleveland, O.
Mercury Mfg. Co., 4044 So. Halsted St., Chicago.
Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Phila., Pa.

TUBING, Aluminum
Aluminum Co. of America, 2107 Gulf Bldg., Pittsburgh, Pa.

TUBING, Brass, Bronze, Copper
American Brass Co., Waterbury, Conn.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Tite-Flex Metal Hose Co., 500 Frelinghuysen Ave., Newark, N. J.

TUBING, Fibre, Bakelite and Mica
Continental Diamond Fibre Co., Newark, Del.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh.

TUBING, Flexible Metal
American Brass Co. (American Metal Hose Branch), Waterbury, Conn.
Tite-Flex Metal Hose Co., 500 Frelinghuysen Ave., Newark, N. J.

TUBING, Seamless
Aluminum Co. of America, Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
Driver-Harris Co., Harrison, N. J.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Co., 1802 Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Revere Copper & Brass Corp., Park Ave., N.Y.C.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Seamless Steel Equip. Corp., 39 Broadway, N.Y.C.
Synthane Corporation, Oaks, Pa.
Timken Steel & Tubes, Inc., Canton, Ohio

TUBING, Stainless Steel
Crucible Steel Co. of America, 405 Lexington Ave., New York
National Tube Co., 1802 Frick Bldg., Pittsburgh
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, O.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tubes, Inc., Canton, O.

TUMBLING BARRELS
Baird Machine Co., Bridgeport, Conn.
Barber Tumbling Machine Works, P. O. Box 283, Oak Park, Ill.
Globe Machine & Stamping Co., 1250 West 76th St., Cleveland, O.
Hartford Steel Ball Co., Hartford, Conn.
Ransohoff, N., Inc., Carthage, Cincinnati
Royersford Fdry. & Mach. Co., Royersford, Pa.
Whiting Corp., Harvey, Ill.

TUMBLING MACHINES
Barber Tumbling Machine Works, P. O. Box 283, Oak Park, Ill.

TURBINES, Steam
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh
Wing, L. J., Mfg. Co., 154 W. 14th St., N.Y.C.

TURNBUCKLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

TURRET LATHES (see Lathes, Horizontal and Vertical Turret)

TWIST DRILLS
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., 6918 Central Ave., Cleveland, O.
Union Twist Drill Co., Athol, Mass.

UNIONS, Pipe
Aluminum Co. of America, Pittsburgh, Pa.
Dart Mfg. Co., E. M., 134 Thurbers Ave., Providence, R. I.
Dresser Mfg. Co., S. R., Bradford, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Revere Copper & Brass Corp., Park Ave., N.Y.C.
Watson-Stillman Co., Roselle, N. J.

UNIT COOLERS & HEATERS
Unit Heater & Cooler Co., Wausau, Wis.

UNIVERSAL JOINTS
Apex Mach. & Tool Co., Dayton, O.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Borgeson Mfg. Co., Bridgeport, Conn.
Boston Gear Works, Inc., North Quincy, Mass.
Gray & Prior Machine Co., Hartford, Conn.
Hanson Clutch & Machinery Co., Tiffin, O.
Moline Tool Co., 102 Twentieth St., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Philadelphia Gear Works, Philadelphia, Pa.

UPSETTING FORGING MACHINES
Acme Machry. Co., St. Clair Ave., NE. Cleveland
Ajax Mfg. Co., Euclid P. O., Cleveland, O.
National Machinery Co., Tiffin, O.

USED MACHINERY (see Searchlight Section)
Aaron Machy. Co., 126 Lafayette St., N. Y. C.
Atlas Equipment Co., 116 S. Clinton St., Chicago, Ill.
Adams, Ogden R., 66 State St., Rochester
Alliance Machinery Co., 206 Centre St., N. Y. C.
Armel, J. P., Pittsburgh, Pa.
Armstrong & Bros. Co., R. S., 676 Mariette St. N. W., Atlanta, Ga.
Beal & Co., Jos., 465 Atlantic Ave., Boston
Beatty Machy. & Mfg. Co., Hammond, Ind.
Belyea Co., Inc., 151 W. 18th St., N. Y. C.
Bernstein, G. M., 10 So. Clinton St., Chicago
Betwinik Bros., 67 Water St., New Haven, Conn.
Bradley Machy. Co., 529 E. Jefferson Ave., Detroit, Mich.
Brant, W. E., Machinery Co., 513 Empire Bldg., Pittsburgh, Penna.
Buffalo Machy. Co., 833 Grant St., Buffalo
Burns Machy. Co., F. W., 411 No. 3rd St., Milwaukee
Central Mach. Tool Corp., 19 Lucas St., Toledo
Cincinnati Machy. & Supply Co., 28 W. 2nd St., Cincinnati, Ohio
Consolidated Used Machry. Mart, 440 N. Oakley Blvd., Chicago
Delta Equipment Co., 148 N. 3rd St., Phila.
DeWitt Tool Co., 173 Grand St., N. Y. C.
Dony Machine Co., D. E., 1115 Bay St., Rochester, N. Y.
Duquesne Elec. & Mfg. Co., Pittsburgh
Eastern Machinery Co., 3200 Spring Grove Ave., Cincinnati, Ohio
Emerman & Co., Louis E., 1761 Elston Ave., Chicago, Ill.
Falk Mill Supply Co., Inc., 18 Ward St., Rochester, New York
Fraser, E. L., 141 N. Third St., Philadelphia
French, F. A., 635 S. Braddock Ave., Pittsburgh, Penna.
Ganey Machinery Co., 125 Arthur St., Buffalo
General Mach. Corp., 140 Federal St., Boston.
George & Co., James W., 3131 E. Jefferson Ave., Detroit
Goldman Co., Harvey H., 10567 Gratiot Ave., Detroit, Mich.
Harris, Coleman, 1695 Elmwood Ave., Buffalo
Hasco, Inc., 38 Clinton St., Newark, N. J.
Hill-Clarke Machinery Co., 651 Washington Blvd., Chicago, Ill.
Howarth Machy. Co., C. C., 1440 Franklin St., Detroit
Hyman & Son, Jos., Tioga, Livingston and Almond Sts., Philadelphia, Penna.
Industrial Machy. & Motor Co., 6420 E. Lafayette Ave., Detroit
Indianapolis Machy. & Supply Co., 1959 S. Meridian St., Indianapolis, Ind.
Industrial Equip. Co., 850 Broad St., Newark
Industrial Machy. Co., 2100 Fletcher Ave., Indianapolis, Ind.
International Machinery Co., 3171 Bellevue Ave., Detroit, Mich.
Interstate Machinery Co., 130 S. Clinton St., Chicago, Ill.
Iron & Steel Products Co., Railway Exchange, Chicago, Ill.
Iroquois Machinery Co., 662 Ohio St., Buffalo
Jones Mach. Tool Co., 531 E. Front St., Cincinnati, O.
Land, L. J., 140 Grand St., New York City
Leach Machinery Co., H., 296 Dyer St., Providence, R. I.
Lucas & Son, Inc., J. L., 3 Fox St., Bridgeport, Conn.
Lunney, Frank J., 953 N. Front St., Philadelphia
Machinery Dealers, Inc., 419 Chapel St., New Haven, Conn.
Marr-Galbreath Machinery Co., 57 Water St., Pittsburgh, Penna.
McCabe & Sheeran Machy. Corp., 50 Church St., N. Y. C.
Midwest Equip. Co., 630 W. Lake St., Chicago
Miles Machinery Co., Saginaw, S. W. Mich.
Monarch Machinery Co., No. Third St., Phila.
Morey Machinery Co., Inc., 410 Broome St., New York City
Morris Machy. Co., Inc., 97 Chestnut St., Newark, N. J.
Motch & Merryweather Machy. Co., Benton Bldg., Cleveland.
Motor Repair & Mfg. Co., The, 1548 Hamilton Ave., Cleveland, Ohio
Moyer, J. N., 465 North 5th St., Philadelphia,
National Machy. Exch., 128 Mott St., N.Y.C.
Norton B'way Machy. Co., 610 Baymiller St., Cincinnati
O'Brien Machinery Co., 113 N. 13th St., Philadelphia, Penna.
Osborne & Sexton Machy. Co., Columbus, O.
Ott Machinery Sales, Inc., 546 2nd Ave., Detroit, Mich.

USED MACHINERY (Continued)
Palmer Edwards Co., 2330 No. Dort Hway., Flint, Mich.
Patron-Millwright Machy. & Transmission Co., 154 Grand St., New York, N. Y.
Reliance Machy. Sales Co., 1407 Brighton Rd. N. S., Pittsburgh, Penna.
Reynolds & Son, Inc., Geo. T., 171 Pine St., Providence, R. I.
Riverside Machinery Depot, 251 St. Aubin Ave., Detroit, Mich.
Rosenkranz & Weisbecker, 149 Broadway, N.Y.C.
Ross Power Eq. Co., Indianapolis, Ind.
Scott-Bansbach, 4611 W. 20th St., Chicago, Ill.
Segal Machinery Co., 113 S. Clinton St., Chicago, Ill.
Simmons Machine Tool Corp., North Broadway, Albany, N. Y.
Standard Machinery & Supply Co., The, 218 High St., Boston, Mass.
Strong, Carlisle & Hammond Co., 1392 W. 3rd St., Cleveland, Ohio
Sun Machinery Co., Inc., 39 Van Buren St., Newark, N. J.
Surplus Material & Machy. Co., 8733 Kercheval Ave., Detroit, Mich.
Toledo Machy. Exchange Co., 1 No. St. Clair St., Toledo
Tupholme Co., Pittsfield, Mass.
Vine, R. A., 652 W. Willis Ave., Detroit, Mich.
Victor Mach. Co., 128 S. Clinton St., Chicago.
Wiener Machy. Co., 237 Centre St., N. Y. C.
Vickers Incorporated, 1410 Oakman Blvd., Detroit, Mich.
Wehrhein Machy. Co., 75 Ogden St., Newark.
West Penn Machinery Co., 1208 House Building, Pittsburgh, Pa.
Wigglesworth Machinery Co., 199 Bent St., Cambridge, Mass.
Wrol Co., C. I., 11 Park Place, New York City
Wyatt Machinery Co., C. G., 1203 Princess Ave., Camden, N. J.

VALVES
Brown Instrument Co., Phila., Pa.
Consolidated Ashcroft Hancock Co., Inc., Bridgeport, Conn.
Hancock Valve Div. Manning Maxwell & Moore, Inc., Bridgeport, Conn.

VALVES, Air Control
Barber-Colman Co., Rockford, Ill.
Bristol Co., Waterbury, Conn.
Curtis Pneumatic Machinery Co., 1924 Kienlen Ave., St. Louis, Mo.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Galland-Henning Mfg. Co., Milwaukee, Wis.
Hanna Engng. Works, 1765 Elston Ave., Chicago
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hannifin Mfg. Co., 621 South Kolamer Ave.,
Hunt & Son, C. B., Salem, Ohio
Keckley, C. O., 567 Washington Blvd., Chicago
Logansport Machine Inc., Logansport, Ind.
Nicholson & Co., W. H., 114 Oregon St., Wilkes-Barre, Pa.
Ohio Brass Co., Mansfield, Ohio
Philadelphia Gear Works, Philadelphia, Pa.
Tagliabue Mfg. Co., C. J., Park & Nostrand Aves., Brooklyn, N. Y.
Taylor Instrument Co., Rochester, N. Y.
Tompkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Wood Company, R. D., Philadelphia, Pa.

VALVES, Electrically Operated
Atkins, E. C. and Co., 402 S. Illinois St., Indianapolis, Ind.
Automatic Temperature Control Co., 34 E. Logan St., Pittsburgh, Pa.
Barber-Colman Co., Rockford, Ill.
Bristol Co., Waterbury, Conn.
Chapman Valve Mfg. Co., Pinevale St., Indian Orchard, Mass.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Leeds & Northrup Co., 4934 Stenton Ave., Phila.
Logansport Machine Inc., Logansport, Ind.
Keckley, C. O., 567 Wash. Blvd., Chicago.
Nicholson & Co., W. H., 114 Oregon St., Wilkes-Barre, Pa.
Oilgear Co., 1403 W. Bruce St., Milwaukee
Philadelphia Gear Works, Phila., Pa.
Racine Tool & Mach. Co., Racine, Wis.
Reading-Pratt & Cady Div. Amer. Chain & Cable Co., Inc., Bridgeport, Conn.
Taylor Instrument Co., Rochester, N. Y.
Vickers Incorporated, 1410 Oakman Blvd., Detroit, Mich.
Watson-Stillman Co., Roselle, N. J.

VALVES, Hydraulic
Baldwin-Southwark Corp., Pachall P. O. Station, Phila., Pa.
Buckeye Iron & Brass Works, Dayton, Ohio
Burroughs Engrg. Co., Clinton & Beaver Sts., Newark, N. J.
Chapman Valve Mfg. Co., Pinevale St., Indian Orchard, Mass.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Flufio Specialties Co., Inc., Blanchester, O.
Galland-Henning Mfg. Co., Milwaukee, Wis.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
Homestead Valve Co., Coraopolis, Pa.
Hunt & Son, C. B., Salem, O.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Keckley, C. O., 567 Washington Blvd., Chicago, Ill.
Logansport Machine Inc., Logansport, Ind.

WHERE-TO-BUY DIRECTORY

VALVES, Hydraulic (Continued)
National Automatic Tool Co., South 7th and N. Sts., Richmond, Ind.
Nicholson & Co., W. H., 114 Oregon St., Wilkesbarre, Pa.
Oilgear Co., 1403 W. Bruce St., Milwaukee
Racine Tool & Mach. Co., Racine, Wis.
Robertson Co., John, 121 Waters, Brooklyn
Sundstrand Mach. Tool Co., Rockford, Ill.
Vickers Incorporated, 1410 Oakman Blvd., Detroit, Mich.
Watson-Stillman Co., Roselle, N. J.

VARIABLE SPEED TRANSMISSIONS (see Transmission, Variable Speed)

VARNISHES
Bakelite Corporation, Bound Brook, N. J.
Kay & Ess Co., Dayton, Ohio
Maas & Waldstein, Newark, N. J.
Sherwin-Williams Co., 101 Prospect Ave., Cleveland

V-BELTS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Boston Gear Works, Inc., North Quincy, Mass.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., Denver, Colo.
Gilmer Co., L. H., Tacony, Phila., Pa.
Goodrich, B. F., Co., 576 South Main St., Akron, Ohio
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., Passaic, N. J.
Miller & Co., Carl A., 2 Howard St., N. Y. C.
Republic Rubber Co., Youngstown, Ohio
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Starrett, L. S., Co., Crescent St., Athol, Mass.

V BLOCKS
Brown & Sharpe Mfg. Co., Providence, R. I.
Graham Mfg. Co., 73 Willard Ave., Providence, R. I.
Greenfield Tap & Die Corporation, Sanderson St., Greenfield, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

VERNIERS
Brown & Sharpe Mfg. Co., Providence, R. I.

VIBRATION DAMPENING
Felters Co. Inc., 210 South St., Boston, Mass.
Sundt Engineering Co., 4238 Lincoln Ave., Chicago

VISES, Air Operated
Champion Blower & Forge Co., Lancaster, Pa.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
Knu-Vise Products Co., Inc., 6432 Cass Ave., Detroit, Mich.
Logansport Machine Inc., Logansport, Ind.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Tomkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.

VISES, Drilling Machine
Armstrong-Blum Mfg. Co., 333 N Francisco Ave., Chicago, Ill.
Armstrong Bros. Tool Co., 315 N. Francisco ave., Chicago, Ill.
Athol Machine & Foundry Co., 82 South St., Athol, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Desmond Stephan Mfg. Co., Urbana, Ohio
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Graham Mfg. Co., 73 Willard Ave., Providence, R. I.
Knight Machinery Co., W. R., 3920 West Pine Blvd., St. Louis, Mo.
Logansport Machine Inc., Logansport, Ind.
Martin Tool & Die Works, 545 W. State St., Springfield, Ohio
Modern Machine Tool Co., Jackson, Mich.
Procunier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Roversfold Fdry. & Mach. Co., Inc., Royersford, Pa
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Thomas Hoist Co., 20 S. Hoyne Ave., Chicago
Wesson Co., Detroit, Mich.

VISES, Jig
Athol Machine & Foundry Co., 82 South St., Athol, Mass.
Avey Drilling Machine Co., Inc., Cincinnati, O.
Graham Mfg. Co., 71 Willard Ave., Providence
Knu-Vise Products Co., Inc., 6432 Cass Ave., Detroit, Mich.
Martin Tool & Die Works, 545 W. State St., Springfield, Ohio
Procunier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Wesson Co., Detroit, Mich.

VISES, Machinists' Bench
American Chain Div. of Amer. Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport, Conn.
Athol Machine & Foundry Co., 82 South St., Athol, Mass.
Avey Drilling Machine Co., Inc., Cincinnati, O.
Brown & Sharpe Mfg. Co., Providence, R. I.
Desmond-Shephan Mfg. Co., Urbana, Ohio
Western Tool & Mfg. Co., Springfield, Ohio

VISES, Milling Machine
Athol Machine & Foundry Co., 82 South St., Athol, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Cochrane-Bly Co., 15 St. James St., Rochester
Desmond-Stephan Mfg. Co., 317 S. Walnut St., Urbana, O.
Hartford Special Machinery Co., 282 Homestead Ave., Hartford, Conn.
Kearney & Trecker Corporation, 6784 West National Ave., Milwaukee, Wis.

Knight Machinery Co., W. R., 3620 W. Pine Blvd., St. Louis, Mo.
Knu-Vise Products Co., Inc., 6432 Cass Ave., Detroit, Mich.
Martin Tool & Die Works, 545 State St., Springfield, Ohio
Miller & Crowningshield, Greenfield, Mass.
Procunier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Roversfold Fdry. & Mach. Co., Inc., Royersford, Pa.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Thomas Hoist Co., 20 S. Hoyne Ave., Chicago.
U. S. Tool Co., Ampere, N. J.

VISES, Pipe
Armstrong Bros. Tool Co., 5700 Bloomingdale Ave., Chicago, Ill.
Athol Machine & Foundry Co., 82 South St., Athol, Mass.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo, Ohio
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.
Williams & Co., J. H., 75 Spring St., N. Y. C.

VISES, Planer and Shaper
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Cincinnati Shaper Co., Hopple & Garrard, Cincinnati, Ohio
Columbia Machine Tool Co., 1798 Fairgrove Ave., Hamilton, Ohio
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Graham Mfg. Co., 73 Willard Ave., Providence, R. I.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Martin Tool & Die Works, 545 W. State St., Springfield, Ohio
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Wesson Co., Detroit, Mich.

VISES, Sawing
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio

VISES, Universal
Covel Mfg. Co., Benton Harbor, Mich.

VOLTMETERS
Bristol Company, Waterbury, Conn.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

WASHERS
Aluminum Co., of America, Pittsburgh, Pa.
Boston Gear Works, Inc., North Quincy, Ill.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Continental Diamond Fibre Co., Newark, Del.
Felters Co. Inc., South St., Boston, Mass.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Goodrich Company, B. F., Akron, O.
Graton & Knight Co., Worcester, Mass.
Houghton & Co., E. F., Philadelphia, Pa.
Metalcraft Mfg. Co., H. K., 390 Second Ave., N. Y. C.
National Motor Bearing Co., 1100 78th Ave., Oakland, Calif.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Synthane Corp., Oaks, Pa.

WASHERS, Cast Bronze
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Wrought Washer Mfg. Co., Bay St., Milwaukee, Wis.

WASHERS, Centrifugal
Barrett Co., Leon J., Worcester, Mass.

WASHERS, Fibre
Continental Diamond Fibre Co., Newark, Del.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Metalcraft Mfg. Co., H. K., 390 Second Ave., N. Y. C.
Wrought Washer Mfg. Co., Bay St., Milwaukee, Wis.

WASHERS, Laminated
Felters Co. Inc., 210 South St., Boston, Mass.
Laminated Shim Co., 21-14—44th Ave., Long Island City, N. Y.
Wrought Washer Mfg. Co., Bay St., Milwaukee, Wis.

WASHING MACHINES
Blakeslee & Co., G. S., Cicero Sta., Chicago, Ill.
Meatiwash Machinery Co. Inc., 117 E. 24th St., N. Y. C.
Ransohoff Inc., N., W. 71st St., Carthage, Cincinnati, O.

WATTMETERS
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa.

WELDING ELECTRODE HOLDERS
Jackson Electrode Holder Co., 15122 Mack Ave., Detroit, Mich.
Lincoln Electric Co., 12818 Coit Rd., Cleveland, Ohio
Linde Air Products Co. Inc., The, N. Y. C.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

WELDING ELECTRODES
Lee & Son, K. O., Aberdeen, S. D.
Wilson Welder & Metals Co., 60 E. 42nd St., N. Y. C.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

WELDING EQUIPMENT
Pier Equipment Mfg. Co., Benton Harbor, Mich.

WELDING AND CUTTING MACHINES AND Equipment, Oxy-Acetylene
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
Koven and Bros. Inc., L. O., Jersey City, N. J.
Linde Air Products Co. Inc., 30 E. 42nd St., New York, N. Y.
Oster Mfg. Co., The, 2057 East 61st Place, Cleveland, Ohio
Walls Sales Corp., 90 Warren St., N. Y.

WELDING GOGGLES AND HELMETS
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
Allen-Bradley Co., 1326 South Second St., Milwaukee, Wis.
American Optical Co., Southbridge, Mass.
Davis Emergency Equip. Co., 55 Van Dam St., N. Y. C.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Hobart Bros. Co., Box FR-17, Troy, Ohio
Jackson Electrode Holder Co., 15122 Mack Ave., Detroit, Mich.
Lincoln Electric Co., 12818 Coit Rd., Cleveland, O.
Linde Air Products Co. Inc., 30 E. 42nd St., New York, N. Y.
Mine Safety Appliance Co., Braddock St., Pittsburgh
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Willson Products Inc., Reading, Pa.

WELDING GUNS
Martin Electric Co., 705 Piquette St., Detroit, Mich.
Progressive Welder Co., 737 Piquette Ave., Detroit, Mich.
Thomson-Gibb Elec. Welding Co., 161 Pleasant St., Lynn, Mass.

WELDING MACHINES, Butt
Armgio Co., Milwaukee, Wis.
Atkins, E. C. and Co., 402 S. Illinois St., Indianapolis, Ind.
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Eisler Engrg. Co., Newark, N. J.
Federal Mach. & Welder Co., Warren, O.
Martin Electric Co., 705 Piquette St., Detroit, Mich.
Ohio Machine Tool Co., Kenton, Ohio
Taylor Hall Welding Corp., Worcester, Mass.
Taylor-Winfield Co., Warren, O.
Thomson-Gibb Electric Welding Co., Lynn, Mass.

WELDING MACHINES, Electric Arc
Eisler Engrg. Co., Newark, N. J.
General Electric Co., Schenectady, N. Y.
Giant Grip Mfg. Co., Oshkosh, Wis.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Hobart Bros. Co., Box FR-17, Troy, Ohio
Lincoln Electric Co., Cleveland, Ohio
Miller Electric Mfg. Co. Inc., 905 N. Meade St., Appleton, Wis.
Ohio Brass Co., Mansfield, Ohio
Pier Equipment Mfg. Co., Milton & Cross Sts., Benton Harbor, Mich.
Raytheon Mfg. Co., 190 Willow St., Waltham, Mass.
Roth Welding Engrg. Co., Detroit
Taylor-Winfield Co., Warren, O.
Una Welding Co., Cleveland, Ohio
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., N. Y. C.

WHERE-TO-BUY DIRECTORY

WELDING MACHINES, Flash
Armglo Co., Milwaukee, Wis.
Federal Mach. & Welder Co., Warren, O.
Martin Electric Co., 705 Piquette St., Detroit
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Ohio Machine Tool Co., Kenton, Ohio
Taylor Hall Welding Corp., Worcester, Mass.
Thomson-Gibb Electric Welding Co., Lynn, Mass.

WELDING MACHINES, Seam
Armglo Co., Milwaukee, Wis.
Eisler Engrg. Co., Newark, N. J.
Federal Mach. & Welder Co., Warren, O.
Martin Electric Co., 705 Piquette St., Detroit
Ohio Machine Tool Co., Kenton, Ohio
Taylor Hall Welding Corp., Worcester, Mass.
Taylor-Winfield Co., Warren, O.
Thomson-Gibb Electric Welding Co., Lynn, Mass.

WELDING MACHINES, Spot
Armglo Co., Milwaukee, Wis.
Eisler Engineering Co., Inc., Newark, N. J.
Federal Mach. & Welder Co., Warren, O.
Koven Bros. Inc., L. O., Jersey City, N. J.
Martin Electric Co., 705 Piquette St., Detroit
Ohio Machine Tool Co., Kenton, Ohio
Pier Equipment Mfg. Co., Milton & Cross Sts., Benton Harbor, Mich.
Progressive Welder Co., Detroit, Mich.
Roth Welding Engrg. Co., Detroit
Taylor Hall Welding Corp., Worcester, Mass.
Taylor-Winfield Co., Warren, O.
Thomson-Gibb Electric Welding Co., Lynn, Mass.

WELDING RODS
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
Aladdin Rod & Flux Mfg. Co., Box 935 Madison Sq. Station, Grand Rapids, Mich.
American Brass Co., Waterbury, Conn.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Colmonoy Inc., P. O. Box 977, Los Nietos, Calif.
Driver-Harris Co., Harrison, N. J.
Eisler Engineering Co., Inc., Newark, N. J.
Electric Arc Cutting & Welding Co., 152 Jelliff Ave., Newark, N. J.
Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill.
Harnischefeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Haynes Stellite Co., Kokomo, Indiana
Hobart Bros. Co., Box FR-17, Troy, Ohio
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit,
International Nickel Co. Inc., 67 Wall St., N. Y. C.
Lincoln Electric Co., Cleveland, Ohio
Linde Air Products Co., 30 E. 42nd St. N. Y. C.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Metal & Thermit Corp., 120 Broadway, N. Y. C.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Ohio Brass Co., Mansfield, Ohio
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Thomas Prosser & Son, 120 Wall St., N. Y. C.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Son, Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Una Welding Co., Cleveland, Ohio
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York

WELDING RODS, Aluminum
Aluminum Co. of America, Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Lincoln Electric Co., 12818 Coit Rd., Cleveland, O.

WELDING SHIELDS
American Optical Co., Southbridge, Mass.
General Electric Co., Schenectady, N. Y.
Jackson Electrode Holder Co., 15122 Mack Ave., Detroit, Mich.
Lincoln Electric Co., Cleveland, Ohio
Ohio Brass Co., Mansfield, Ohio
Wilson Welder & Metals Co., 60 E. 42nd St., N. Y. C.

WELDING SUPPLIES
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
Lincoln Electric Co., Cleveland, Ohio
Linde Air Products Co., 30 E. 42nd St., New York City
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wickwire Spencer Steel Co., New York City

WELDING TIMERS
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio
Raytheon Mfg. Co., 190 Willow St., Waltham, Mass.
Taylor Hall Welding Corp., Worcester, Mass.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Welding Timer Mfg. Co., Inc., 251 Ogden St., Newark, N. J.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

WHITE PRINT PROCESS
Ozalid Corp., 354 Fourth Ave., New York

WINCHES
Electro-Lift, Inc., 30 Church St., N. Y. C.
Round and Son, David, Newburgh Station, Cleveland, Ohio
Shepard Niles Crane & Hoist Co., Montour Falls, N. Y.

WIRE CLOTH
Wickwire Spencer Steel Co., New York City

WIRE, Cold Heading
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Union Drawn Steel Co., Massillon, Ohio
Universal Steel Co., Bridgeville, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St.,

WIRE, Copper, Brass and Bronze
American Brass Co., Waterbury, Conn.
Anaconda Wire & Cable Co., N. Y. C.
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

WIRE CUTTING & STRIPPING MACHINES
Artos Engrg. Co., Milwaukee, Wis.

WIRE, Electric Resistance
American Brass Co., Waterbury, Conn.
Baker & Co., Inc., 54 Austin St., Newark, N. J.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit
Prosser & Son, Thomas, 120 Wall St., N. Y. C.

WIRE, Flat, Round, Square or Special Shapes
Aluminum Co. of America, Gulf Bldg., Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
Firth-Stirling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Page Steel & Wire Div. Amer. Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh
Revere Copper & Brass Inc., 230 Park Ave.,
Wickwire Spencer Steel Co., New York City

WIRE, Piano and Music
Firth-Sterling Steel Co., McKeesport, Pa.
Wickwire Spencer Steel Co., New York City

WIRE ROPE
American Cable Div. of Am. Chain & Cable Co., Inc., 250 Park Ave., New York, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
Hazard Wire Rope Div. of Am. Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Wickwire Spencer Steel Co., New York City,

WIRE, Stainless Steel
American Steel & Wire Co., Chicago, Ill.
Carpenter Steel Co., 109 W. Bern St., Reading,
Firth-Sterling Steel Co., McKeesport, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet,
Page Steel and Wire Division of American Chain & Cable Company, Inc., Monessen, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh,
Prosser & Son, Thomas, 120 Wall St., N. Y. C.
Republic Steel Corp., Republic Bldg., Cleveland
Wickwire Spencer Steel Co., 41 E. 42nd St., New York

WIRE, Steel
American Steel & Wire Co., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Page Steel and Wire Division of American Chain & Cable Company, Inc., Monessen, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York

WIRE NAIL MACHINES
National Machinery Co., Greenfield St., Tiffin, Ohio
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.

WIRE STRAIGHTENING & CUTTING MACHINES
Lewis Machine Co., 3441 E. 76th St., Cleveland
Shuster Co., F. B., New Haven, Conn.

WIRE STRIPPERS
Globe Tool & Engrg. Co., Dayton, Ohio

WOODWORKING MACHINERY
American Saw Mill Machinery Co., Hackettstown, N. J.
Barnes Co., W. F. & John, Rockford, Ill.
Boice Crane Co., Toledo, Ohio
Defiance Machine Works, Defiance, Ohio
Delta Mfg. Co., 600 E. Vienna St., Milwaukee,
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Francis Co., Chas. E., W. Fifth St., Rushville, Ind.
Greenlee Bros. & Co., Twelfth St., and Columbia Ave., Rockford, Ill.
Mattison Machine Works, Blackhawk Park Ave. and C. B. & Q. Tracks, Rockford, Ill.
Oliver Machinery Co., Grand Rapids, Mich.

WORM CUTTING MACHINES
Adams Company, East Fourth St., Dubuque, Iowa
Colonial Broach Co., Detroit, Mich.

WORM CUTTING MACHINES (Continued)
Detroit Tap & Tool Co., Detroit, Mich.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Micuigan Tool Co., Detroit, Mich.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

WORM DRIVES
Adams Company, East 4th St., Dubuque, Iowa
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bilgram Gear & Machine Works, 1223 Spring Garden St., Philadelphia, Pa.
Boston Gear Works, Inc., North Quincy, Ill.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Colonial Broach Co., Detroit, Mich.
Chas. E. Crofoot Gear Corporation, South Easton, Mass.
DeLaval Steam Turbine Co., Trenton, N. J.
Detroit Tap & Tool Co., Detroit, Mich.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2635 Canton St., Chicago,
Grant Gear Works, Inc., 154 W. Second St., South Boston, Mass
Link Belt Company, 2045 W. Hunting Post Ave., Philadelphia, Pa.
Mechanical Specialties, Inc., 2635 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston Mass.
Michigan Tool Co., Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.
Winfield H. Smith, Inc., Springville, Erie County, N. Y.

WORMS, Hourglass Cutting Machines
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Michigan Tool Co., Detroit, Mich.

WRENCHES
Dresser Mfg. Co., S. R., Bradford, Pa.

WRENCHES, Chain
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Williams & Co., J. H., 75 Spring St., N. Y. C.

WRENCHES, Drop Forged
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Black-Hawk Mfg. Co., Milwaukee, Wis.
Bonney Forge and Tool Works, Allentown, Pa.

WRENCHES, Pipe
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Bonney Forge and Tool Works, Allentown, Pa.
Greene, Tweed & Co., 109 Duane St., New York, N. Y.
Greenfield Tap & Tie Corp., Sanderson St., Greenfield, Mass.
Peck, Stow & Wilcox Co., Center St., Southington, Conn.
Williams Co., J. H., 75 Spring St., N. Y.

WRENCHES FOR PORTABLE TOOLS
Apex Machine and Tool Co., Dayton, Ohio

WRENCHES, Pneumatic
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.

WRENCHES, Ratchet
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Bonney Forge and Tool Works, Allentown, Pa.
Greene, Tweed & Co., 109 Duane St., N. Y. C.
Starrett Co., The L. S., Crescent St., Athol, Mass.
Williams Co., J. H., 75 Spring St., N. Y.

WRENCHES, Screw
Holo-Krome Screw Corp., Hartford, Conn.

WRENCHES, Socket
American Swiss File & Tool Co., 400 Trumbull St., Elizabeth, N. J
Holo-Krome Screw Corp., Hartford, Conn.

WRENCHES, Tap
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
S. W. Card Mfg. Co. (Div. Union Twist Drill), Mansfield, Mass.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Greenfield Tap & Tie Corp., Sanderson St., Greenfield, Mass.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Co., Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Starrett Co., The L. S., Crescent St., Athol, Mass.
Union Twist Drill Co., Butterfield Division, Derby Line, Vt.

X-RAY Equipment
St. John X-Ray Service, Inc., 30 Thomson Ave., Long Island City, N. Y.

ZINC PLATES
American Sheet & Tin Plate Co., Pittsburgh
New Jersey Zinc Co., 160 Front St., New York
Republic Steel Corp., Republic Bldg., Cleveland

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